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NEW SERIES.

VOL. X.—PART I.

CAMBRIDGE AND BOSTON:

WELCH AND BIGELOW.
METCALF AND DAKIN.

1868.

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I.

*Catalogue * of Auroras observed, mostly at Cambridge, after the year* 1838.

BY JOSEPH LOVERING,

HOLLIS PROFESSOR OF MATHEMATICS AND NATURAL PHILOSOPHY IN HARVARD COLLEGE.

Cambridge, 1838.

* 1 Feb. 21. Brilliant Aurora. A light began to appear in the north at 8^h: large streamers crossed the heavens. At 10^h, they were arranged in vertical arcs, streaming up nearly to the zenith and concentrating in the northern horizon. Afterwards, their upper extremities assumed the color of brilliant scarlet. At 11^h, the streamers were agitated, the light faded and flashed up again, instantaneously, during half an hour. Soon after this, the Aurora faded out, and at 12^h was wholly invisible, except as a bank of diffuse light in the north.

* 2 Feb. 22. A few streamers in the evening.

* 3 " 23. At 10^h, a few faint patches of light scattered over the heavens.

1839.

* 4 Jan. 11. Beautiful Aurora at 10^h.

* 5 Sept. 3. A magnificent display of Aurora. At the end of twilight, several columns of brilliant scarlet light had started from the northern horizon, and at 8^h had nearly reached the zenith, streamers also ascending now from the east and south. In half an hour the whole firmament was flooded with light. Soon after 9^h, a corona was formed, in the direction of the resultant of the earth's magnetism at this place. The columns then broke, and attempted to form again with partial success. At 10^h, the heavens were covered with a brush of light.

Dorchester, 1839.

6 Sept. 1. Aurora Borealis, altitude 4°, steady, apex E. of N. 5°, 7^h 45^m. Arch lower at 9^h

7 Sept. 3. Aurora.

8 " 28. Faint N. Aurora, altitude about 2°, with wane and dark below; at 9^h 30^m, strong steady light, altitude 15° to 20°, wane.

9 Oct. 22. Aurora during night.

10 Dec. 21. 7^h 0^m. Aurora, dark wane clouds below, white, steady, low, say 5°. Strong Aurora, dark below, apex about 7° east of north. Aurora active at 8^h 35^m. Aurora low and steady. Arch well defined, steady. A few dark wane clouds above the arch. Aurora faint and low. Strong light among wane clouds. Wane, bright auroral arch quiet, wane rising at N.

Cambridge, 1840.

11 Feb. 6. Aurora at altitude of 2°, diffused white light, steady, with long, low, dark wane clouds.

12 " 7. Low, faint Aurora, altitude 3°, with long, dark, pointed wane.

13 Mar. 22. Aurora Borealis, white diffused light, apex at 4°, with wane across.

14 " 29. Aurora, dark wane below.

*15 Apr. 24. Slight Aurora.

16 May 1. Aurora, height of arch 3° at N. Broken and active, with dark wane and detached nebula.

*17 " 28. Remarkable Aurora. An arch was formed at 9^h 15^m P. M., running, as nearly as could be ascertained, at right angles to the magnetic meridian. A crown began to form at 11^h. Its position was referred to *a Coronæ Borealis*, which was then upon the meridian.

* Those marked with an asterisk were observed by myself: the others by the late W. C. Bond or G. P. Bond of the Harvard Observatory, being copied from its records by permission of the Director, Joseph Winlock.

AUG 7 - 1923 Aurora

As it was at about the same altitude as the star, viz., 74° 52′, and to the east of the meridian, it could not have been far from the magnetic pole of Dip. Shortly afterwards, the arch was broken up and the northern sky covered with pulsations of light.

*18 May 29. Brilliant Aurora. The auroral arch was first seen at 9h 8m P. M., extending from a point nearly east to within a few degrees of the western horizon. The light was intense. The apex of the arch was situated, at first 20°, and at 9h 18m about 30°, south of the zenith. After this time the light broke and scattered, flying from east to west. This arch was entirely detached from the main body of the Aurora, and resembled a streamer. In the north there was a diffused light, but very bright and swift flashes toward the zenith. At 10h 35m, a large meteor was seen in the north, 20° high, descending towards the northwest.

19 June 21. Faint Aurora at 12h 0m.

*20 " 26. About 9h 12m P. M., an Aurora was seen in the north, of a white diffused light. At 12h 56m, the Aurora assumed a dull appearance, with dark wane intermixed. At 1h 36m, the Aurora became more active, and some streamers were seen. The magnetometer was slightly affected at this time.

*21 July 4. Between 12h 4m and 12h 10m, bright diffused Northern Lights: occasionally, long streamers: wane clouds near the Northern horizon: magnetometer quiet.

*22 July 29. At 9h 21m, an auroral arch was formed, about 7° above the horizon, and very motionless. At 9h 40m, it began to move toward the zenith, and rose to the altitude of 30°. At 10h 30m, the Aurora had disappeared. The light was dull during the whole time.

*23 Aug. 19. A steady auroral arch was observed. It was double, and the altitude of its apex at 10h 30m was 7° or 8°. Its color was dull white. This Aurora continued till 10h 36m, and at 10h 47m the Northern Lights had disappeared.

*24 " 28. An auroral arch appeared, running from east to west, of intense brightness and diffused, but without streamers. Its apex was nearly on the meridian, and at 9h 6m its altitude was about 45°. At 9h 56m, streamers shot up, 60° from the horizon: the altitude of its highest part was about 76° 43′, as found from its place among the stars.

25 Aug. 31. Aurora, bright arch 4°, at 13h.

26 Sept. 21. Strong Aurora with streamers, at 12h.

*27 Oct. 22. Between 8h and 9h, an Aurora of a steady blue light was first perceived: it afterwards grew whiter and brighter. The altitude was 3°, with wane clouds below. At 11h 56m, the Aurora was low.

*28 Nov. 30. At 10h, an Aurora was seen of white diffused light. No regular arch was formed. The magnetometer was quiet.

1841.

29 Jan. 14. Aurora, low wane, at 10h P. M.

30 " 27. Aurora, low and faint, at 9h 30m.

31 Feb. 22 Aurora, masses of white light, chiefly E. of N., at 8h 20m, extending from eastern horizon to zenith and passing to the south.

32 " 23. Aurora low at N. by E. Streamer.

33 Mar. 12. Auroral arch, altitude of apex about 5°, direction north by 10° east, steady, at 8h P. M.

34 " 14. Strong Aurora, wane below, masses of white light, detached above, at 7h.

35 " 15. Dull Aurora with wane.

36 " 16. Pale Aurora, low, clear.

37 " 20. Slight Aurora, with wane at north.

38 " 21. Faint Aurora, with dark wane clouds.

39 April 11. Aurora low, with wane.

40 " 14. Strong Aurora, with wane intermixed.

41 " 16. Aurora low, at 2° P. M.

42 " 18. Brilliant Aurora, streamers, 5° to 6°.

43 " 19. Aurora, decided arch with faint streamers, at 9h 0m.

44 May 8. Aurora, slight. P. M.

45 July 11. Aurora, faint and low at 9h P. M.

46 " 19. Bright Aurora blended with wane, broken double arch, at 9h 30m P. M.

47 Sept. 13. Midnight auroral arch, height about 5°, steady.

48 " 25. Masses of auroral clouds, at 8h an arch and streamers in N. N. W.

49 " 26. Red auroral cloud at N. W.

50 Oct. 14. Aurora at 10h P. M., low, ill-defined, [illegible] wane.

[illegible] 15. Slight Aurora, at 11h 30m.

[illegible] 19. Aurora.

[illegible] 21. Aurora, diffused light, steady, and wane clouds low in North, at 9h P. M.

51 Nov. 18. At 8h 20m, a very beautiful Aurora was seen. The period of greatest brightness was 8h 1m. At 8h 26m, the Aurora had nearly vanished, leaving only faint traces of columns. At 9h 6m, there was observed in the north a large bright arch of light, mov-

ing slowly westward, and also small drifting spots of bright light near the horizon. At $9^h\ 16^m$, the illumination extended from the northern horizon up to 30° of altitude. At $11^h\ 36^m$, the Aurora was shining brightly.

55 Dec. 21. Faint traces of Aurora, at $11^h\ 30^m$.

*56 " 24. At $6^h\ 36^m$, delicate shoots of Aurora were visible nearly up to the zenith. At $6^h\ 46^m$, the Aurora disappeared near *Capella*, but grew brighter in the zenith. At $6^h\ 48^m$, it disappeared from the zenith, and shone again in *Auriga*. At $6^h\ 52^m$, no trace of the Aurora could be seen. The magnetometers were disturbed.

1842.

*57 Jan. 4. Between $6^h\ 21^m$ and $6^h\ 51^m$, an Aurora was seen in the northeast and northwest.

*58 " 5. About $6^h\ 36^m$, an auroral arch was visible in the northeast, at the altitude of 8°; but it soon died away.

*59 " 7. At $10^h\ 20^m$, an arch of Aurora, 12° high, was seen in the north, northwest. The same arch, with another resting upon it, at an altitude of 20°, was visible at $10^h\ 10^m$: at $10^h\ 40^m$, the upper arch was partly broken: at $10^h\ 45^m$, a similar appearance was presented in the southeast. In both these arches, stars were visible, though not elsewhere, as it was cloudy.

*60 " 9. At $9^h\ 21^m$, a light appeared, shining through the clouds in the north.

61 " 11. Aurora Borealis at midnight, height 5° to 7°, bright, with wane clouds.

62 " 12. Faint Aurora Borealis, with cirri and wane, at $6^h\ 30^m$.

63 " 15. Aurora Borealis, strong, well defined arch at 9^h. At 12^h, diffused light, low, at north.

*64 Jan. 15. A diffused arch was visible in the northwest, whose apex was from 10° to 12° high. At $9^h\ 26^m$, the arch was bright.

65 Feb. 11. Aurora low (3°), diffused, brighter on the easterly part, at 7^h P. M.

*66 Feb. 11. A slight Aurora was observed.

67 Mar. 23. Aurora. P. M.

68 Apr. 10. Aurora, bright and steady, height about 3°, at 9^h.

69 " 12. Auroral arch, bright, steady, altitude of apex from 7° to 10°.

*70 Aug. 8. At $2^h\ 36^m$, an auroral light was seen in the north.

71 Sept. 28. Aurora, low and diffused, with wane at north.

72 Nov. 21. Bright Aurora.

73 Nov. 28. Aurora low in north, at 11^h P. M.

74 Dec. 27. Aurora among broken clouds, at $10^h\ 15^m$ P. M.

1843.

75 Aug. 3. Strong and lively Aurora, with merry dancers, at 10^h P. M.

76 Sept. 27. Bright auroral arch, apex 5° N. by E.

77 Oct. 14. Strong auroral arch 5°, apex north, at $6^h\ 30^m$. More diffused at 7^h.

78 Nov. 15. Slight Aurora at 5^h A. M.

1844.

79 Mar. 25. Aurora.

80 April 5. A well defined auroral arch at 9^h, a very rare phenomenon of late, altitude of apex 3° to 5°, bore north by 5° E. at 10^h.

81 " 17. Aurora, low at north with wane.

82 May 7. Northern Lights and merry dancers, at 10^h P. M.

83 " 8. Aurora again, low, at 9^h P. M.

84 Oct. 20. Bright auroral arch, apex due north, altitude about 4°.

85 Dec. 14. Aurora.

1845.

86 Jan. 9. Brilliant Aurora.

87 April 13. Masses of northern light at 10^h.

88 " 30. Auroral light through clouds.

89 Sept. 24. Northern light.

90 " 25. Aurora.

91 Oct. 21. Strong auroral light.

92 Dec. 3. Aurora.

93 " 5. Aurora, low and diffused.

1846.

94 Jan. 28. Very strong Aurora, apex E. of N. 3°, altitude 10°.

95 Feb. 26. Aurora dancing.

96 Apr. 15. Northern Lights 10°, brightest in N. E., shooters.

97 " 16. Aurora.

98 May 4. Aurora shooting, faint.

99 July 14. Northern Lights.

100 Aug. 11. Bright Aurora, with streamers, 8^h–9^h.

101 " 24. Splendid Aurora.

102 Sept. 10. Auroral light formed at 8^h P. M. an arch of 10° in breadth, to the N. E. The interior of the arch was darker, or a deeper blue, than the rest of the sky, the lower edge of the arch cut *α Ursæ Majoris* on the west, and *α Persei* to the eastward. At $8^h\ 20^m$, it was quite bright at times, masses of cloudy light. It faded rather suddenly, and the peculiar wane

clouds, which usually accompany the Aurora Borealis, appeared scattered over the north, at about 5° to 10° above the horizon.

103 Sept. 11. Aurora.

104 " 22. Aurora from 8^h to 9^h in the evening.

105 " 23. Aurora, low.

106 Oct. 7. Very brilliant and active Aurora. The night of the 7–8 was remarkable for its beauty and the fine display of Northern Lights. The formation of cloud in immediate connection with the Aurora was watched with great interest. The apparent process was this. From the strong light of the arch, whose apex was high, and the inner part deep red, the streamers shot upward, and then formed in succession. Vapory light very faint, stronger light in mass. From this, or in the same direction, was gradually formed cirrus and cumulus, from which the moonlight was strongly reflected, and of steady outline. The usual dark wane clouds were formed below.

107 " 19. Aurora with wane.

108 " 21. Aurora at 10^h P. M.

109 Dec. 9. Bright auroral arch 10°. Streamers in the N. W.

1847.

110 Feb. 6. Auroral light with wane clouds.

111 Mar. 8. Northern Lights at 9^h P. M.

112 " 19. At evening auroral arch 10°, apex 3° east of north, increased to one of the most lively and brilliant displays on record.

113 Apr. 7. Northern Lights strong, between dark cumulus.

114 " 16. Aurora at 9^h, P. M., low.

115 May 15. Auroral arch, altitude 5°, at 9^h P. M.

116 Aug. 3. Aurora 5°, 11^h to 12^h, broken by 1^h.

117 " 21. About midnight a splendid Aurora, colored deeply with red.

118 Sept. 29. A splendid auroral display at 8^h to 9^h P. M. Some masses looking like the spectrum of a prism, others of a brilliant red or rose color. One remained stationary for an hour in the S. E., at an altitude of 30°.

1848.

119 Jan. 28. Strong Aurora, with deep red light, but interrupted by clouds, at 8^h 30^m P. M.

120 Feb. 24. Auroral light, strong. Several brilliant displays of Northern Lights this month.

121 Mar. 8. Aurora low and diffused, at 9^h P. M.

122 " 22. Aurora.

123 " 24. Aurora. At 9^h, a fine, steady, well-defined arch. At 10^h 30^m, merry dancers, brilliant, casting strong shadows.

124 Mar. 25. Slight Aurora, low and diffused.

125 Apr. 5. Brilliant, active Aurora, at 11^h 4^m.

126 " 6. Aurora at 9^h P. M. Extensive and diffused at 10^h 30^m.

127 " 15. Aurora, brilliant arch and streamers at 9^h P. M.

128 May 25. Aurora. A beam shot from a cloud near the horizon to *Polaris*; exactly in direction, a little short in distance.

129 " 31. Aurora.

130 July 11. Splendid Aurora up to zenith extending to the south and east. At 10^h, fine.

131 Oct. 6. At 9^h P. M., a very curious and remarkable ridge of light resembling a comet's tail, or a light thin cloud, seen in the N., extending from the horizon up to the zenith, moving slowly off to the southward, at the rate of about a degree a minute, retaining its curved appearance as when first noticed. Supposed it to be auroral light.

132 " 25. Bright Aurora diffused with wane.

133 Nov. 17. Bright Aurora shining through the clouds, like moonlight.

134 " 21. Aurora.

135 " 22. Aurora.

136 Dec. 23. Northern light, diffused, altitude 10°.

1849.

137 Feb. 19. Aurora from 10^h to 12^h. At midnight, quite bright arch, apex 15°, broken at N. W., colored red.

138 Mar. 17. Strong Aurora.

139 May 12. Aurora from 9^h to 10^h P. M., altitude 7°, broken arch.

140 July 13. Aurora from 9^h to $10\frac{1}{2}^h$ P. M., slight auroral arch.

1850.

141 Mar. 4. Strong Aurora, also the same on the two preceding nights.

142 " 11. Aurora, at 9^h P. M.

143 " 31. Bright Aurora with clouds floating in the north.

144 April 2. Slight Aurora during night.

145 " 6. Aurora at 9^h P. M., a fine arch with streamers, and very bright patches and cirro-stratus clouds below and among.

146 " 7. Aurora with streamers and clouds.

147 May 3. Fine auroral arch at 9^h P. M.

148 " 7. Fine Aurora from 14^h to 15^h.

149 July 11. Bright and active Aurora at 9^h and 10^h P. M., shooting to the zenith.
150 " 12. Aurora midst clouds, streamers.
151 Aug. 10. Aurora, about 3° high. At 11^h 15^m, curious appearance of the clouds, stretching from east to west exactly. Aurora bright.
152 " 29–30. Faint Aurora from 9^h to 10^h P. M.
153 Dec. 27. Aurora.

1851.

154 Feb. 5. Bright Aurora.
155 " 18. Bright Aurora.
156 Mar. 29. Aurora.
157 May 24. Aurora, low and diffused.
158 June 5. Strong Northern Lights with streamers, at 9^h P. M.
159 " 27. Slight Aurora.
160 July 26. Strong, irregular Aurora, very bright, from 9^h to 10^h.
161 Aug. 29. Aurora, low arch, full North, 9^h P.M.
162 Sept. 4. A brilliant Aurora, with streamers, and drifting light, at 2^h A. M. At 2^h 30^m, an arch was formed to the southward, apex E. of S., about 40° high; the flashes on this side resembled what is called "heat lightning." To the N. N. W., and N. E. there was frequently rosy and green light. I have not seen a more brilliant display; the wind was unsteady from the N.
163 " 6. Auroral arch at evening until 11^h apex N. to N. N. E., bright moonlight.
164 Sept. 7. At 7^h 15^m P. M. Strong auroral arch 7°, streamers, and rose-light flashing, &c. until 7^h 21^m, then subsided with occasional streamers and diffused light. At 4^h A. M. of the 7th, Mr. Andrew Wyeth reports a brilliant Aurora covering the heavens, never saw the like before.
165 Oct. 2. A fine auroral arch at 9^h P. M., apex N. by E., about 12° high, clear bright moonlight, the arch steady, with long cirro-stratus clouds below.
166 " 20. Fine Aurora commenced at 7^h P. M., during twilight, with a well defined arch, its apex a few degrees E. of N., and altitude about 15°. At 7^h, broken rolling billows, varying every minute, streamer of white light, very dark below; at 8^h 57^m, a dark cloud below fringed above with white light, and above it a regular arch, no streamer; at 9^h 10^m 30^s, a long narrow streamer at E. N. E. just bisected by *Aldebaran;* at 9^h 12^m 5^s, it had moved about one degree northwardly; this was a singular streamer and well adapted to show parallax, if observed elsewhere N. or S; at 9^h 18^m short streamers from N. E. to N. W., rising from dark cloud below; at 9^h 20^m 35^s, a double arch, below steady, the one above has, streamers; at 12^h, diffused light, dark below apex of arch in the north.
167 Oct. 23. At evening till midnight, bright Aurora. At 6^h 30^m well defined, regular arch; then very strong light, radiating, fine, like iron at white heat, not streamers, but strong short rays or spikes.
168 Nov. 15. Low auroral arch, 3° high, apex 1° or 2° E. of N. Arch continuous and well defined, at 9^h P. M.
169 Dec. 29. A very bright auroral arch at 6^h, 5° in width, stretched across the north from N. E. to N. W., highest point about 30°. A smaller one, within this, having an altitude at highest point of about 15°, was seen. The space between these appeared quite dark, and also that within the small circle.
170 " 30. Aurora at 4^h A. M. confined low in the north horizon, diffused sheets of light are continually rushing to the zenith, vanishing before they reach the altitude of 25°.

1852.

171 Jan. 19. Bright Aurora at night.
172 Feb. 18. Bright Aurora.
173 " 19. Aurora of extraordinary brilliancy commenced at evening twilight. Between 10^h and 11^h, corona was in Dec. of Mars, and as nearly as possible in the meridian.
174 " 20. The Aurora yet visible at 6^h, and pretty surely seen after sunrise at 6^h 58^m.
175 " 26. Evening. Aurora.
176 April 10. Aurora below the clouds, at 9^h 10^m.
177 May 18. Fine steady auroral arch during the evening till midnight.
178 " 19. Bright and strong Aurora, with considerable activity.
179 " 20. Aurora bright, with streamers.
180 " 21. Aurora low and diffused at 10^h.
181 June 15–16. Aurora, arch, and streamers.
182 July 5. Aurora, from 9^h to 10^m P. M., interrupted by cirro-stratus clouds, some streamers, to the N. E. red light.
183 " 6. Slight Aurora, brighter at 10^h.
184 " 7. Auroral arch.
185 " 8. Aurora, low and faint.
186 " 9. Bright Aurora over thunder clouds.

187 July 10. Brilliant Aurora.
188 " 11. Diffused Aurora.
189 " 12. Auroral arch 5°, well defined.
190 " 13. Aurora faint.
191 Aug. 14. Aurora, 3° to 5° high.
192 Sept. 2. Auroral arch, 6°.
193 " 4. Aurora with streamers.
194 Sept. 5. Aurora, with merry dancers.
195 " 6. Auroral arch, 3°.
196 " 12. Bright Aurora between clouds, from 9^h to 10^h.
197 " 16. Auroral arch.
198 " 17. Aurora low and diffused, at 10^h P.M.
199 " 18. Bright auroral arch, 3°, streamers.
200 " 29. Fine Aurora from 7^h to 9^h P. M., with streamers.
201 Oct. 5. Aurora, P. M.
202 " 9. Between 7^h and 8^h, R. F. B. saw the flashing of auroral light though the clouds.
203 " 13. Indications of auroral light through the clouds.
204 Nov. 10. An Aurora, low, with streamers, confined to an altitude of 10°.
205 " 11. Strong Aurora with streamers seen through the openings of clouds, in evening.
206 " 12. Aurora.
207 " 15. Aurora, at 9^h P. M.
208 " 16. Aurora, at 9^h P. M.

1853.

209 Jan. 9. Faint Aurora at 10^h P. M.
210 " 30. Aurora bright and broken, at 10^h P.M.
211 Feb. 1. Aurora low and bright, at 9^h P. M.
212 " 14. Brilliant Aurora, P. M.
213 Mar. 8. Aurora, at 10^h 30^m P. M.
214 " 13. Faint Aurora.
215 " 18. Aurora in the evening.
216 April 5. Bright Aurora with wane cloud, along the northern horizon.
217 " 9. Slight Aurora, P. M.
218 May 2. Bright and active Aurora, P. M.
219 " 4. Dull Aurora.
220 " 5. Dull Aurora.
221 June 1. Aurora at 10^h P. M., fine arch.
222 " 6. Slight Aurora from 9^h to 10^h P. M., with wane cloud.
223 " 9. Aurora, from 9^h to 10^h P. M.
224 " 14. Auroral arch, diffused, 10^h P. M.
225 July 12. Active Aurora, broken arch and streamers, at 10^h P. M.
226 Sept. 1. At evening, an Aurora.
227 " 2. Soon after sunset, a bright Aurora was visible, with streamers reaching nearly to the zenith, brightest from 8^h to 11^h.
228 Sept. 3. Aurora through clouds.
229 " 4. Slight Aurora, P. M.
230 Oct. 31. Aurora low and diffused, P. M.
231 Nov. 2. Aurora low but pretty, P. M.
232 Dec. 24. First Aurora this month.

1854.

233 Jan. 2. At evening, a double arch, Aurora remarkably well defined.
234 " 23. Bright auroral arch, altitude 7°.
235 " 28. Bright Aurora, at evening.
236 Feb. 4. Strong and active Aurora, at 9^h–10^h.
237 " 16. Bright Aurora, broken, at 9^h P. M.
238 " 27. Strong Aurora, with bright flashes.
239 Mar. 16. Long bright beams of Aurora.
240 " 21. Aurora in evening, low and diffused.
241 " 28. Aurora, long beams of light.
242 " 29. Aurora in masses, at 9^h P. M.
243 April 20. Faint Aurora, at 9^h P. M.
244 " 21. Strong Aurora, bright beams at 9^h.
245 " 23. Bright Aurora, at 9^h P. M.
246 May 1. Aurora at evening.
247 " 15. Aurora seen through broken clouds.
248 " 16. Aurora in streamers, at 9^h P. M.
249 " 19. Aurora low and faint, 9^h-10^h P. M.
250 June 12. Active and bright Aurora, very changeable, undulating to the westward, appearing to shoot *this side* of some cirro-stratus clouds, at 9^h–10^h P. M.
251 13. Aurora, fine evening.
252 July 10. Aurora.
253 Sept. 13. Aurora in the evening, streamers and wane cloud.
254 " 21. Aurora in the evening.
255 " 26. Bright auroral double arch, streamers *below*, at 8^h 50^m.
256 " 27. Streamers low, at 9^h 15^m P. M.
257 Oct. 18. Bright Aurora from 9^h to 11^h P. M.
258 Nov. 20. Aurora at 10^h P. M.

1855.

259 Jan. 10. Aurora, at 9^h P. M., low.
260 Feb. 5. Diffused Aurora, at 9^h P. M.
261 " 6. A bright well defined auroral arch, altitude of apex 6°, at 10^h 30^m.
262 " 12. Aurora amid cirro-stratus, at 9^h.
263 Mar. 12. Very bright Aurora, extremely active, double arch, dark below, colored light, most brilliant from 7 to 8 o'clock. By 10 o'clock it had subsided to a few streamers and diffused light, with something resembling cirro-stratus clouds low at the north.

264 Apr. 7. Aurora.
265 " 9. Aurora in the evening.
266 " 12. Fine auroral arch, apex 5°, broke into streamers at 10^h P. M., dark below, clear.
267 " 14. Auroral streamers, faint, without arch, at 9^h P. M.
268 Sept. 10. Bright Aurora, between wane clouds, near the horizon.
269 " 17. Slight Aurora.
270 Oct. 9. Aurora.
271 Nov. 29. Aurora, from 6^h to 8^h P. M.

1856.

272 Mar. 30. Low diffused Aurora, at 9^h P. M.
273 Apr. 22. A bright Aurora at 9^h P. M., double arch at 9^h 2^m, P. M., the exterior of the upper limb just touched *α Cephei* and *α Lyræ*.
274 Aug. 22. Bright Aurora, 3° high, some streamers, at 9^h P. M.
275 " 31. A rare exhibition of auroral light at 10^h P. M. First, a regular arch of light, faint and the apex 20° high. Below this arch, broken masses of light, in form resembling cirro-stratus clouds, without streamers, the light steady, or changing its form slowly. One would suppose them to be cirro-stratus clouds, but that the stars *Capella* etc. shone with undiminished splendor though them.
276 Oct. 4. Bright Northern Lights, streamers, broken arch 5°.
277 Nov. 20. Aurora low at 11^h P. M., none at 7^h, 8^h, and 9^h.

1857.

278 Feb. 26. At evening, Aurora for the first time, height of apex 4°, arched.
279 Sept. 7. Aurora in the evening, low arch 3°.
280 " 8. Aurora low, at evening.
281 " 10. Bright Aurora, streamers rising from a bank of cirro-stratus clouds.
282 Nov. 9. Aurora, low and diffused.
283 " 17. Aurora.
284 Dec. 18. Patches of Aurora forming and dissolving rapidly.
285 " 20. Bright Aurora in the evening.

1858.

286 Jan. 8. Bright Aurora, active.
287 " 12. Some traces of Aurora at evening.
288 Feb. 16. Aurora very bright and active, 8^h.
289 Mar. 13. Aurora at evening, irregular arch, dark below.
290 April 10. Active Aurora, apex 10°, dark intervening clouds, at 9^h P. M.
291 " 11. Aurora at night.
292 " 14. Diffused Aurora, at 9^h P. M.
293 " 15. Evening, Aurora diffused.
294 May 7. Strong Aurora between the clouds, at 9^h P. M.
295 July 1. Aurora at 9^h P. M., radiating.
296 " 5. Aurora low.
297 Aug. 30. Aurora bright, in the evening.
298 " 31. A bright Aurora, a strong beam of light from 9^h to 10^h, N. N. E.
299 Sept. 1. Low auroral arch, about 5°, no streamers.
300 " 7. Bright auroral arch, apex having altitude of 10°, somewhat diffused, with short streamers, dark cirro-stratus clouds below.
301 " 8. Low diffused auroral light.
302 " 9. A faint trace of Aurora, at 9^h P. M.
303 " 12. Bright but low auroral arch.
304 " 14. Auroral arch, low.
305 Oct. 2. Aurora, low and bright.
306 " 4. At evening, Aurora, in clouds.
307 " 8. Auroral arch, faded before 10^h P. M., altitude about 15°, well defined.
308 " 9. Aurora, evening, cir. stratus below.
309 " 10. Aurora low and diffused, with clouds.
310 " 27. Brilliant Aurora, *noble arch*. No corona, streamers of deep red, at 8^h P. M.
311 " 31. Aurora, diffused, bright all evening.
312 Nov. 1. Traces of Aurora at evening.
313 " 10. Slight Aurora.
314 Dec. 1. Faint Aurora at evening.
315 " 24. Auroral streamers, at 8^h P. M.

1859.

316 Feb. 22. Fine Aurora, deeply rose tinted, soon disappeared and the sky clouded over.
317 " 23. Slight Aurora.
318 Apr. 29. Bright Aurora, the arches being perfectly formed, streamers and flashes of light beyond the zenith. Lasted till late.
319 July 28. Bright Aurora in the evening.
320 Aug. 28. Fine Aurora, perfect arch at the south, with rose-colored streamers at the east
321 " 29. The telegraph worked by the Aurora this evening, on the line between Boston and Portland, for two hours, with a power equal to 75 or 100 of Grove's cups.
322 Sept. 2. Aurora of an exquisite rose color at 3^h A. M., in the east and south. At 9^h P. M

Aurora very active. From 10h to 11h P. M., fine double arch at the north.

323 Sept. 24. Aurora, at 9h P. M.
324 " 27. Slight Aurora.
325 " 28. Aurora, very fine from 9h to 11h.
326 Oct. 1. Aurora dimly visible through the clouds, at 9h P. M.
327 " 12. Remarkable auroral arch in south from 6h to 7h P. M.
328 " 18. Aurora, at 9h P. M.
329 " 20. Active Aurora, early in the evening.
330 " 21. Aurora, at 9h P. M.
331 Dec. 14. Fine Aurora seen yesterday morning between 5 and 6 o'clock.

1860.

332 Jan. 15. Fine rosy Aurora, from 8h to 9h.
333 Mar. 27. Very brilliant Aurora, of a rich red.
334 Apr. 13. Aurora at 9h P. M.; very active later in the evening.
335 " 14. Aurora, at 9h P. M.
336 May 11. Aurora last night, in the horizon.
337 " 23. Slight Aurora, at 9h P. M.
338 July 19. Active Aurora, at 9h P. M.
339 Sept. 6. Aurora.
340 Oct. 11. Active Aurora, at 8h P. M.
341 Nov. 4. Brilliant auroral arch, at 9h P. M.
342 Dec. 15. Fine rosy Aurora, from 8h to 9h.

1861.

343 Jan. 13. Slight Aurora.
344 " 22. Aurora, at 9h P. M. Red.
345 " 31. Aurora, at 9h P. M.
346 Feb. 27. Aurora, at 8h P. M.
347 Mar. 9. Aurora, at 9h P. M.
348 Apr. 8. Aurora, at 9h P. M.
349 Aug. 4. Aurora.

1863.

350 Apr. 9. Fine auroral display. At precisely 9h P. M., a remarkable and very bright band from near the horizon, on either side, passed exactly through our zenith and within 4° of Arcturus. It moved slowly to the south. Observed at Newburyport at the same time. J. H. S. saw the same, or nearly the same band, reform about 12h 20m.

1864.

*351 June 7. Aurora.
352 Sept. 20. Aurora visible in early twilight At 7h, a band about 7° wide extended from W. N. W. across the zenith to E. S. E. At 7h 20m, two arches, the highest 15° above N. horizon, connected by streamers.
*353 Nov. 19. Aurora.

1866.

*354 Jan. 8. Slight Aurora, at 9h.
*355 " 16. Aurora, from 6h to 10h.
*356 " 27. Slight Aurora.
*357 Feb. 16. Low arch, at 9h.
*358 Mar. 5. Aurora, at 10h.
*359 " 6. Aurora from 9h to 12h, brilliant in N.
*360 " 18. Arch from east to west, at 11h.
*361 Apr. 16. Slight Aurora in north.
*362 " 17. Slight Aurora in north.
*363 May 3. Aurora, at 10h 30m.
*364 " 14. Aurora, at 10h.
*365 June 15. Aurora low in the north, at 11h 30m.
*366 July 12. Aurora from 11h to 12h.
*367 Sept. 6. Slight Aurora, at 10h.
*368 " 12. Aurora, at 10h.
*369 Oct. 3. Aurora, feeble and low.
*370 " 4. Aurora, feeble and low.

1867.

*371 May 2. Slight Aurora.
*372 " 4. Slight Aurora.
*373 " 27. Aurora. Bright at 10h.
*374 July 28. Aurora.
*375 Sept. 21. Bright Aurora.
*376 " 23. Aurora.
*377 " 25. Slight Aurora.
*378 " 26. Aurora.

1868.

*379 March 19. Slight Aurora, at 10h.
*380 " 24. Slight Aurora, at 10h.
*381 April 13. Bright Aurora, at 11h.
*382 " 17. Slight Aurora, at 10h 30m.
*383 " 18. Aurora in the north during the evening. Arch low. About 10h, streamers.
*384 May 12. Aurora at 11h.

II.

On the Periodicity of the Aurora Borealis.

BY JOSEPH LOVERING,

HOLLIS PROFESSOR OF MATHEMATICS AND NATURAL PHILOSOPHY IN HARVARD COLLEGE.

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The object of this memoir is to present a catalogue of auroras from the earliest observed down to the present epoch, and upon this catalogue, as a foundation, to reconstruct the laws of periodicity of the phenomenon. For the observations prior to 1750, I am indebted, principally, to Mairan's first and second catalogues; the latter itself being compiled, for the most part, from numerous smaller catalogues existing in his day.[1] I have introduced, however, many additional observations in high latitudes, ruled out by Mairan, in accordance with the plan of his work; as well as some old auroras brought to light by the investigations of Quetelet, Boguslawski, and Chasles, or by my own researches.

For the last century I have used the following materials: 390 auroras observed at Cambridge, Mass., between 1742 and 1793 by Winthrop or Wigglesworth; 316 auroras observed at the same place, between 1840 and 1864, by W. C. Bond or G. P. Bond or myself; 36 auroras observed at Boston, Mass., between 1818 and 1840, by Hale; 198 auroras observed at Salem, Mass., between 1786 and 1820, by Holyoke: — all published first by myself. I have also compiled, from their original places of publication, 212 auroras observed at Worcester, Mass., between 1839 and 1862, by Woodward, Chandler, or Bemis; 160 auroras observed at Providence, R. I., between 1832 and 1860, by Caswell; 74 auroras observed at Burlington, Vt., in 1852 and 1853, by Thompson; 89

[1] Mairan's first catalogue consists of 229 auroras. His second catalogue of 2137 observed auroras, of which 1441 are independent of each other, comprises Frobes's catalogue of 796 auroras observed between 583 and 1739. To these are added Delisle's catalogue of 233 auroras observed at St. Petersburg between 1726 and 1736; Celsius's catalogue of 384 auroras observed in Sweden between 1716 and 1732; Kirch's catalogue of 106 auroras observed at Berlin between 1707 and 1735; Weidler's catalogue of 91 auroras observed at Wittemberg between 1730 and 1751; the catalogue of Zanotti and Beccari which contains 88 auroras, observed in Italy between 1727 and 1751; Short's catalogue of 148 ancient auroras; Kirch's catalogue of 89 auroras observed between 1549 and 1657; and 202 auroras compiled by Mairan himself from the Transactions of the Royal Society of London.

auroras observed at St. Martin, Canada, in 1853 and 1854, by Smallwood; 53 auroras observed at Wilmington, Del., between 1827 and 1833, by Gibbon; 218 auroras observed at Newberry, Vt., between 1830 and 1862, by Johnson; 389 auroras observed at Toronto, Canada, 169 at Quebec, 107 at London, Canada, 151 at Newfoundland, between 1848 and 1851, by Lefroy, &c.;[1] 84 auroras observed at Jena, Germany, between 1770 and 1796, by Zeissing; 341 auroras observed at Stockholm, Sweden, between 1783 and 1792, by Nicander; 942 auroras observed at St. Petersburg, between 1736 and 1861, by various Russian meteorologists; 231 auroras observed at Brussels, Belgium, between 1778 and 1851, by Mann, Quetelet, &c.; 634 auroras observed at Upsal, Sweden, between 1732 and 1762, by Celsius, Ferner, or Bergman; 225 auroras observed at Berlin, Prussia, between 1735 and 1789, by Beguelin; 108 auroras observed in Paris, France, between 1784 and 1842, by Cassini or Bouvard; 175 auroras observed at Montmorenci or Laon, France, between 1771 and 1805, by Cotte; 81 auroras observed at Spydberg, &c., Norway, between 1784 and 1787, by Wilse; 240 auroras observed at Sagan, Prussia, between 1781 and 1792, by Preuss; 288 auroras observed in Scandinavia, &c., between 1837 and 1840, by Lottin, Thomas, &c.; 216 auroras observed at Mannheim, Germany, between 1781 and 1792, by Hemmer; 48 auroras observed at Copenhagen, Denmark, between 1782 and 1788, by Bugge; 54 auroras observed at Ratisbon, Germany, by Heinrich, and 47 auroras observed at Prague, Austria, by Strnad, between 1781 and 1791. With these I have united Loomis's catalogue of 813 auroras observed at New Haven, Conn., between 1763 and 1854, by Stiles or Herrick; Hough's catalogue of 1205 auroras observed in the State of New York, between 1826 and 1851; Leche's catalogue of 119 auroras observed at Abo, Finland, between 1749 and 1762;[2] Argelander's catalogue of 163 auroras observed at Abo, between 1823 and 1831, and at Helsingfors, between 1832 and 1837; Hallström's catalogue of 682 auroras observed at Abo, between 1748 and 1828, and at Helsingfors, between 1829 and 1843; Block's catalogue of 430 auroras observed at Gothaab, Greenland, between 1841 and 1846; Noodt's catalogue of 91 auroras observed at Hammerfest, Norway, between 1850 and 1861; Dalton's catalogue of 250 auroras observed at Kendall or Keswick, England, between 1786 and 1793, and his catalogue of 185 auroras observed in Great Britain and Ireland, between 1794 and 1834; Huxham's catalogue of 120 auroras observed at Plymouth, England, between 1728 and 1748; Broun's catalogue of 184 auroras observed at Makerstoun, Scotland, between 1843 and 1849; Stevenson's catalogue of 238 auroras observed at Dunse, North Britain, between 1838 and 1847;[3] Hansteen's

[1] Phil. Mag., Fourth Series, IV. 61–63.

[2] Svenska Vetensk. Acad. XXIV. 267.

[3] Proc. Royal Society, London, VI. 291. Phil. Mag., Fourth Series, VI. 21.

catalogue of 534 auroras observed at Christiania, Norway, between 1837 and 1853; Rudolph's catalogue of 185 auroras observed at Jakobshavn, Greenland, between 1840 and 1851; Eisenlohr's catalogue of 87 auroras observed at Carlsruhe, Germany, between 1779 and 1831; and Cotte's catalogue of 231 auroras observed at Franeker, Holland, between 1771 and 1781, by Van Swinden. Much assistance has been found in Force's notices of auroras published in the Smithsonian Contributions. No great use could be made of Boué's learned catalogue on account of the confusion of *old* and *new style*, the substitution of the number of auroras in a month for the day of the month, and other numerous inaccuracies in the compilation and printing of this catalogue. It is not necessary to refer to the general catalogues or tables of Arago, Quetelet,[1] Kämtz,[2] Muncke, Bertholon, Reuss, or to the Collection Académique, as they contain little not derived from older sources already enumerated.

I have also made a laborious examination of the publications of the English, Swedish, French, German, Russian, Austrian, and Italian Academies, and of the Journals of those countries, and have collected from these and other sources, as travels, Arctic voyages, histories, &c., numerous examples of auroras which have entered into no former catalogue. The name of the country where an aurora is observed, when known, is printed in *italics*. The name of the observer is added if possible, and also that of the author of the printed record, with such other authorities and references as may be convenient for the student. An attempt has also been made to reduce the date of each observation, when given in *old style*, to the Gregorian reckoning. But this task is beset with great difficulties.

In 1780 Van Swinden[3] submitted to the Royal Academy of Sciences of Paris the prospectus of a "Plan d'un Traité sur l'Aurore Boréale, pour servir de suite à celui de M. de Mairan." Van Swinden informs the public that it was within his power to insert many auroras which Mairan had overlooked, — partly drawn from printed books, but especially derived from two manuscript collections which had been given to him, — the first of 170 auroras observed at Breda by Eckhard, between 1719 and 1740, for which he was indebted to the son of the observer (of these auroras there are 64 which are not found in the catalogue of Mairan); and the second of 64 auroras observed in North Holland, between 1741 and 1749, which Van Swinden received from Engelman. Van Swinden also promised some observations on auroras made during a maritime voyage, in 1741, which he had in manuscript. He also proposed to extend Mairan's catalogue from 1751 to 1778, by adding printed and manuscript

[1] Sur la Physique du Globe, par Quetelet.

[2] Lehrbuch der Meteorologie, III. 468.

[3] Rozier, Observations sur la Physique, XV. 128–134.

observations, partly made by himself and partly obtained from his brother, at La Haye, and by Engelman, at Amsterdam. Van Swinden lived until 1823, and yet, to the grief of science, he does not appear to have carried his plan into successful execution.

In regard to Mairan's chronology Van Swinden offers the following criticism: —

"Le troisième objet qui nous occupera sera de rectifier les erreurs qu'il nous paroît que de Mairan a commis. Nous ne prétendons pas rabaisser par-la le mérite de ce savant illustre: il est bien plus aisé de rectifier quelques inadvertances, que de débrouiller un chaos de plus de deux mille observations. Ces erreurs proviennent toutes d'une seule source: de la reduction de l'ancien style au nouveau. La table donnée par M. Frobés sert de base à celle de M. de Mairan. Or M. de Mairan a cru (p. 468) que M. Frobés s'est servi de l' ancien style, tant avant qu' après la reformation du Calendrier: et en conséquence il a avancé toutes les dates, qui se trouvent dans la table du physicien allemand de onze jours pour ce siècle, et à proportion pour les siècles précédens. Mais on peut prouver tant par toute la contexture de la table de M. Frobés que par ses propres paroles (page 35 de son ouvrage[1]) qu'il a employé le nouveau style au moins la plupart du temps et pour les observations d'Allemagne, pays dans les Etats Protestants duquel on sait que le nouveau style est en usage depuis le commencement de ce siècle. Cette inadvertance de M. de Mairan l'a conduit à deux erreurs essentielles: la première, que les dates des aurores boréales, mentionnées par M. Frobés, et tirées de son ouvrage par M. de Mairan, se trouvent, pour ce siècle, trop avancées de onze jours. La seconde, qu'on trouve souvent un double emploi de la même aurore boréale, si elle se trouve citée par M. Frobés et par quelqu' autre auteur. Par exemple, l'aurore boréale du 16 d'Octobre 1719, se trouve au 16 de ce mois, suivant l'observation de M. Kirch; et l'on en trouve une autre au 27 du même mois, qui est celle que M. Frobés a rapportée au 16, et qui M. de Mairan a placée au 27 par le changement de style. Voilà donc une seule aurore boréale réellement employée deux fois. Nous nous trouvons donc obligés de refondre entièrement la Table chronologique et d'y mettre toute l'exactitude dont nous serons capables."

This is the passage in Mairan's treatise to which Van Swinden refers: —

"M. Frobés et la plupart des Auteurs ou il a puisé, ayant suivi l'ancien style dans leur dates, tant avant qu' après la reformation du calendrier, j'ai été obligé de ramener au nouveau *toutes celles que M. Frobés n'y a pas ramenées:* et cela non seulement pour la commodité du plus grand nombre des Lecteurs, mais surtout, parce que le nouveau style est conforme à l'état du Ciel, et que l'ancien ne l'est pas, et s'en écarte considérablement, depuis le IV^me^ siècle.[2]"

It appears from the sentence I have partly italicised that Van Swinden is mistaken when he says that Mairan has advanced *all* the dates given by Frobes, as if they had been given by the latter in *old style*.[3] In many cases Frobes has specified the *style* which he adopts, and it is sometimes according to the Julian and at other times according to the Gregorian calendar: and in these plain cases Mairan has committed no error. Moreover, in Maraldi's observations, where the style is not specified, but where it must

[1] Van Swinden probably alludes here to the following passage of Frobes, found not on page 35, but on page 95. "Studio Suecicas et Germanicas luminis borei observationes ab invicem disjungimus: siquidem ipsarum tempora, propter styli seu calendarii diversitatem, haud omnino congruunt. Facta autem styli utriusque comparatione, quoties phænomena Suecica cum reliquis coinciderint explorari haud difficulter poterit. Ceterum observari quoque hic meretur ea phænomena quæ Decembr. m. d. XXI. et seq. in Suecia contingunt, apud eos qui *stylo novo* seu *calendario emendato* utuntur ad annum proxime sequentem referri oportere.

[2] Traité Physique et Historique de l'Aurore Boréale, p. 468. See, also, pp. 188, 189.

[3] Nova et antiqua Luminis atque Auroræ Borealis Spectacula, pp. 57, 58, 71–94, 95–98, and 100–118.

have been known to Mairan, no change has been made, as in the auroras of April 11, 12, and 13, of Dec. 15 and 16, 1716; of April 6, 9, 10, and 11, 1717; of Feb. 6 and 10, of Nov. 29, 1720; of Feb. 17, 23, and 28, 1721.[1] In other cases there is no doubt that Mairan has occasionally been led into error by advancing dates already expressed in the *new style*. No copy of Frobes's book could be found in this country, and I did not succeed in obtaining a copy from Europe until the printing of my own catalogue had proceeded too far to allow me to introduce any changes. It is to be understood, therefore, that the dates here attached to Frobes's auroras are the same as those adopted by Mairan, unless it is specially stated to the contrary.

Although the catalogue of auroras, which I now present to the public, comprises nearly 10,000 independent auroras, and more than 50,000 observations, I do not claim that it has exhausted the supply. On the contrary, I can myself point out some of its deficiencies. It is well known that Musschenbroek observed the aurora during 29 years at Utrecht and Leyden, and collected a catalogue of 720 auroras. In one of his works[2] he has arranged these auroras according to the months in which they appeared; but the individual observations, so far as I am aware, have never been published. A laborious meteorologist[3] of the last century has stated that he possessed in manuscript the observations of Musschenbroek, and that he intended to publish them with others in a third volume of Memoirs; which, however, never appeared. As Musschenbroek has classified his auroras according to the months of the year, they are available in the study of the *annual* changes of the aurora; it is to be regretted that they cannot also be used in the investigation of those fluctuations which observe longer periods. Of the different countries which have contributed to swell the grand capital of auroral observations, Russia, always devoted to meteorology and the physics of the globe, stands foremost; an almost uninterrupted series of auroras having been regularly observed and published at St. Petersburg, since the foundation of the Imperial Academy of Sciences in 1726.

Not finding the published record of auroras for St. Petersburg so complete in recent years as formerly, I wrote to M. Kupffer, Director of the Central Physical Observatory of Russia, requesting to be furnished with full materials. In reply to my inquiries I received from Kupffer a table, which contains, as he says, the auroras observed in Russia between the years 1841 and 1861 inclusive.[4] Kupffer remarks that the aurora borealis always announces its presence by very strong oscillations of the magnetic needle, which

[1] Frobes, Nova et Antiqua Luminis atque Auroræ Borealis Spectacula, pp. 79, 81, 89, and 90.

[2] Cours de Physique, 2489.

[3] Cotte's Mémoires sur la Météorologie, I. 366 and II. 169. Also, Journ. de Phys. LXX. 168 and LXXIII. 153.

[4] It is incorporated in my Yearly and Monthly Table for St. Petersburg, pp. 186, 187 of this Memoir.

it is impossible to confound with the irregular oscillations by which it is sometimes affected, and in the recurrence of which Sabine has discovered a striking periodicity. These strong and irregular disturbances are repeated over the whole line of Magnetic Observatories from St. Petersburg to Nertchinsk, so that a table, derived from the registers of St. Petersburg, is likewise adapted to the other observatories. In many localities the heavens may be shut in by clouds and the auroras not visible, when their presence is suspected from the oscillations of the needle.

Ideler, in his "*Meteorologia Veterum Græcorum et Romanorum*, p. 49," devotes a few pages to the investigation of "Auroræ borealis apud veteres vestigia." Ideler makes the following criticism upon the supposed allusions of Aristotle to the aurora:

"Aristoteles describit phænomena, quæ *χάσματα, βοθύνους, καὶ αἱματώδη χρώματα* vocat. Quale intelligendum sit phænomenon, re vera dictu est difficillimum. Itaque, priusquam de ipso agimus, quantum fieri potest accuratam descriptionem ex ipsius verbis eruere conemur. Phænomena non nisi *nocte serena* cerni, incensionem flammæ ardori similem esse, comparari posse splendorem cum flamma per fumum visa, dicit; denique non longo temporis spatio in cœlo remanere. Colores igni refractione luminis in crassiore aëre censet, exemplum afferens rubicundum stellarum orientium et occidentium colorem, potissimum vero eminere puniceum et purpureum, quia cæruleus cum atro confundatur et vix discerni queat. Multi de aliis rebus cogitaverunt, nos non dubitamus quin auroras boreales intellexerit Aristoteles (quarum fortasse nullam suis ipse oculis conspexit) imprimis verbis commoti: *Omnino in tenebris albus color tot præbet varietates, ut flammam per fumum adspicere tibi videaris:* quæ ad borealis auroræ speciem proxime accedunt. Difficultates tamen remanent plures; prior, cur Aristoteles non dixerit, ejus modi phænomena in boreali tantum plaga oriri, immo in libro *de mundo* (si omnino illius auctor est, qua in re video dissentire grammaticos) dicat id rarissime tantum versus meridiem et septemtriones oriri; altera deinde in verbis: *Interdiu Sol cohibet, noctu vero, excepto uno colore puniceo, reliqui propter eundem fere cœli colorem non apparent*, cum tamen boreales auroræ omnes prismaticos colores præbeant."[1]

Ideler quotes the following lines from Lucan's Pharsalia, I. 526: —

"Ignota obscuræ viderunt sidera noctes
Ardentemque polum flammis, cæloque volantes
Obliquas per inane faces, crinemque tremendi
Sideris, et terris mutantem regna cometen.

He also adduces the following passage from Tacitus:[2] —

"Sonum insuper audiri, formas deorum et radios capitis adspici persuasio adjicit."

The lines quoted in the Annals of Philosophy, IX. 250, do not appear to me to refer to the aurora.

Armorum sonitum toto Germania cælo
Audiit.[3]

[1] See Aristotle's Meteorol., Lib. I. Cap. 5. Also, Ideler's Aristotelis Meteorologicorum Libri, I. 374 and II. 330.

[2] Germania, Cap. XLV.

[3] Virgil, Georgic. I. 474.

Milman[1] makes the following allusion to the aurora which appeared in the summer of 167 B. C.: —

"The doom of the city had not been without its portent. Early in the year the heavens had been ablaze with what appeared horsemen in cloth of gold, tilting at each other, with the flash of swords and bucklers. The wild tumult in the sky lasted for forty nights."

Milman draws his description from this passage in Maccabees: —

"And then it happened that through all the city, for the space almost of forty days, there were seen horsemen running in the air, in cloth of gold, and armed with lances, like a band of soldiers. And troops of horsemen in array, encountering and running one against another, with shaking of shields, and multitude of pikes, and drawing of swords, and casting of darts, and glittering of golden ornaments and harness of all sorts."[2]

Milman adds, in a note: —

"In my younger days I described an Aurora Borealis, I had myself seen it, in lines which might seem to be, but were not, taken from the book of Maccabees.

"Forth springs an arch,
O'erspanning with its crystal pathway pure
The starry sky: as though for Gods to march,
With show of heavenly warfare daunting earth,
To that wild revel of the northern clouds:
They now with broad and bannery light distinct
Stream in their restless waverings to and fro, . . .
Anon like slender lances bright start up,
And cross and clash, with hurtle and with flash
Tilting their airy tournament.

Samor, Book III. p. 42."

Milman also alludes to this passage in Humboldt's Cosmos:[3]

"Mit nicht geringer Wahrscheinlichkeit kann man vermuthen, dass das merkwürdige von der Erde pyramidal aufsteigende Licht, welches man auf der Hochebene von Mexico 1509, vierzig Nächte lang, am östlichen Himmel beobachtete und dessen Erwähnung ich in einem alt-aztekischen Manuscripte der Königliche Pariser Bibliothek, im Codex Telleriano-Remensis, aufgefunden, das Thierkreislicht war."

In the book of Job,[4] an early allusion is supposed to have been made to the aurora borealis:

"And now men see not the bright light which is in the clouds: but the wind passeth and cleanseth them.
Fair weather cometh out of the north: with God is terrible majesty."

[1] History of the Jews. Third Edition, I. p. 461.
[2] Second of Maccabees. V. 2d and 3d verses.
[3] Kosmos, I. 145. See also Plutarch's Lives, III. 124. Marius.
[4] Job XXXVII. 21 and 22.

Dr. G. R. Noyes translates these verses thus:

"Men cannot look upon the light,
When it is bright in the skies,
When the wind hath passed over them and made them clear,
And a golden brightness cometh from the sky,—
But with God is terrible majesty."

On this passage Dr. Noyes has made these comments in a note:

"*And a golden brightness:* literally *gold;—from the sky:* literally, from the North. Hence some have supposed the northern lights, or aurora borealis, to be referred to. But it is more probable that the Northern, or upper hemisphere, stands for the whole firmament here, as in Chap. xxvi. 7. I suppose the reference is to the dazzling brightness reflected from the skies when the sun is in the meridian. The light, mentioned without any special application, seems naturally to refer to the light of the sun. This light also dazzles the eye more than that of the aurora borealis."

GENERAL CATALOGUE OF AURORAS.

B. C.

502. Obsequens,[1] Lycosthenes,[2] and Frobes.[3]
465. Livy, Obsequens, Frytschius,[4] Frobes.
" Lycosthenes, Chasles,[5] Boguslawski.
463. Livy, Obsequens, and Lycosthenes.
" Frobes, Chasles, and Boguslawski.
461. Obsequens, Lycosthenes, Frobes,[6] and Chasles.
460. Lycosthenes, Chasles, Boguslawski.[7]
443. *Athens.* Nihusius,[8] Frobes.
394. Pliny,[9] Calvisius,[10] Frobes.
350. Frytschius,[11] Frobes, Chasles, Lycosthenes.
334. *Egypt.* Lycosthenes, Frobes,[12] and Chasles.
237. *Thuscia.* Lycosthenes,[13] Frobes, and Chasles.
223. *Thuscia.* Obsequens and Lycosthenes.
" Frytschius, Frobes, Chasles, and Bogusl.
217. *Rome, Sicily, Præneste.* Obsequens.
" Livy, Lycosthenes,[14] and Frobes.

[1] De Prodigiis, Cap. IX.
[2] Prodigiorum ac Ostentorum Chronicon, p. 70.
[3] Nova et antiqua Luminis atque Auroræ Borealis Spectacula.
[4] Catalogus Prodigiorum.
[5] Compt. Rend., XII. 499. Nouv. Mém. de l'Acad. Brux., XV. 51.
[6] Boguslawski says they were in the years 463, 461, and 460.
[7] Pogg. Ann. Bd. XC. Ergänzungsband IV. p. 62. Livy, III. 10. Boguslawski says it was in the year 458.
[8] De Divinatione Sacra et Profana, Lib. VII. Cap. VII.
[9] Historia Nat. Mundi, Lib. II. Cap. XXVII.
[10] Opus Chronologicum.
[11] Pliny, Historia Nat. Mundi, Lib. II. Cap. XXVII.
[12] Vincentius, Speculum Naturale (?), Lib. V. Cap. LV.
[13] He quotes Cassiodorus. Boguslawski gives the year 236.
[14] Boguslawski gives the year 214.

B. C.

208. Lycosthenes,[15] Chasles, and Boguslawski.
204. *Setia.* Livy and Obsequens.
" Lycosthenes, Peucer,[16] and Frobes.
203. *Anagnia.* Livy, Obsequens, Peucer, Frobes.
" Lycosthenes, Chasles, and Boguslawski.
202. Nihusius and Frobes.
200. *Lucania.* Obsequens and Lycosthenes.[17]
" Frobes, Chasles, and Boguslawski.
175. *Gabii.* Livy and Obsequens.
" Lycosthenes and Boguslawski.
173. *Lanuvium.* Livy, Obsequens, and Frobes.
" Lycosthenes and Boguslawski.
169. *Anagnia.* Obsequens and Lycosthenes.
" Peucer, Frobes, and Boguslawski.
168. Seneca, Lycosthenes, and Frobes.[18]
167. *Lavinium.* Obsequens, Lycosthenes, and Frobes.
166. *Lanuvium.* Obsequens and Lycosthenes.
" Frobes and Boguslawski.?
163. *Capua. Formia.* Obsequens.
" Lycosthenes, Frobes, and Boguslawski.[19]
162. *Anagnia.* Obsequens and Lycosthenes.
" Frobes and Boguslawski.
136. *Præneste.* Obsequens, Lycosthenes, Peucer.

[15] He quotes Diodorus Siculus, VII. 161. Bibliothecæ Historicæ, Lib. XVI.
[16] Commentarius de Præcipuis Divinationum Generibus, p. 345.
[17] Boguslawski gives the year 197.
[18] Maccab. Bk. II., Ch. 5, verses 2 and 3. Edin. New Phil. Journ., XLVII. 148.
[19] Boguslawski gives the year 160.

136. B. C. Nihusius, Frobes, and Boguslawski.
133. Nihusius and Frobes.
128. Obsequens, Lycosthenes, Frobes.
113. Obsequens, Lycosthenes, and Frobes.[1]
103. *Ameria.* Obsequens and Lycosthenes.
" *Tudertum.* Frobes and Boguslawski.[2]
94.? *Vesta.* Obsequens and Lycosthenes.
" Frobes and Boguslawski.
93. *Vulsinum.* Lycosthenes.
" Frobes and Boguslawski.
92. Obsequens and Lycosthenes.
" Frobes and Boguslawski.
63. Obsequens, Lycosthenes, Frobes, Boguslawski.
17.? Obsequens, Lycosthenes, and Frobes.
14. A. D. Seneca,[3] Frobes.
" Lycosthenes, Wolffius.[4]
20.? Seneca, Frobes.[5]
27.? Fincelius, Liebknecht,[6] and Frobes.
31.? Seneca,[7] Frobes.
50. Lycosthenes, Frobes.
65. April 8. *Jerusalem.* Lycosthenes, Frobes.[8]
72. May 21. Chasles.[9] [Doubtful.]
162. Lycosthenes and Chasles.
196. Lycosthenes and Frobes.
384. Lycosthenes and Frobes.
394. Pilgram.[10] [Probably a comet.]
397.? Pilgram.
400. Lycosthenes and Frytschius.
" Frobes and Chasles.
402. Frytschius and Frobes.
412.? Lycosthenes and Chasles.
450. Pilgram.
451. Pilgram.
454. Lycosthenes, Frytschius, and Frobes.
" Pilgram, Chasles, and Boguslawski.
462.? Lycosthenes and Frobes.

[1] Pliny, Historia Nat. Mundi. Lib. II. Cap. XXXIII.
[2] Pliny, Historia Nat. Lib. II. Cap. LVIII. (B. says 102.)
[3] Naturales Quæstiones. Lib. I. Cap. 1.
[4] Lection. Memorab. Cent. XIV. p. 14.
[5] It is doubtful whether this was an aurora.
[6] Pharus sive de Prodigiis Ignis Cælest. p. 11.
[7] Sub Tiberio Cæsare cohortes in auxilium Ostiensis coloniae cucurrerunt tanquam conflagrantis. Quæst. Nat. I. 15. The same mistake was made at Copenhagen in 1731, and a hundred years later at Konigsberg. It was again repeated at New Orleans in 1839, and in London in 1847. (See note 5, p. 20, right col.)
[8] He quotes Josephus, De Bello. Lib. VII. Cap. 12.
[9] Chasles quotes from Lycosthenes, but Boguslawski says he cannot find the passage.
[10] Untersuchungen über d. Wahrscheinliche d. Wetterkunde &c.

480. Pilgram.
488. *Berlin.* Pilgram.
501. Aug. 22. *Edessa?* Frobes, Mairan,[1] Pilgram.
541. Pilgram.
552. Pilgram.
555.[2] Lycosthenes and Boguslawski.
556.? Lycosthenes and Boguslawski.[3]
560. *Berlin.* Pilgram.
563. Gregory,[4] Quetelet,[5] and Boguslawski.
564. Frytschius, Tylkowsky,[6] and Frobes.
566.[7] Pilgram.
567.? Lycosthenes, Frobes, and Chasles.
570. *Italy.* Frytschius, Lycosthenes.
" Frobes, Pilgram and Chasles.
577. Pilgram.
580. *Paris.* Gregory. Lycosthenes.
" Frobes, Pilgram and Perrey.[8]
582. Pilgram and Perrey.
583. Feb. 4. Frobes, Mairan,[9] Pilgram, Acad. Coll.[10]
584. Gregory, Frobes and Bertholon.[11]
585. July. Gregory, Mairan, and Pilgram.
" Sept. *x.* Gregory, Mairan, and Pilgram.
" " *x.* Gregory, Mairan, and Pilgram.
" " *x.* Gregory, Mairan, and Pilgram.
587. Gregory? Frytschius and Frobes.
595. *Rome.* Tylkowsky, Liebknecht,[12] Frobes.
602. Pilgram.
603. Lycosthenes, Frobes, and Chasles.
629. Pilgram.
654. *France.* Frytschius and Frobes.
673. Frytschius and Frobes.
676. *Rome.* Frytschius, Lycosthenes, Frobes.
677. Pilgram.
752. Pilgram.
765. Pilgram.
775. Pilgram.

[1] Traité Physique et Historique de l'Aurore Boreale, p. 180. Mairan places this aurora in the year 502.
[2] Annals of Philosophy, IX. 250. Matthews, p. 101.
[3] He quotes Sigebertus in Chronicon ab anno 381 ad 1113.
[4] Gregorius Turonensis Historia Francorum. Lib. IV. Cap. XXXI.
[5] Mém. de l'Acad. Bruxelles, XV. 22.
[6] Physica Curiosa, P. III. p. 246.
[7] Frobes describes a *strange light* seen this year, but it was not probably an aurora.
[8] Compt. Rend. XIV. p. 69.
[9] Mairan quotes Gregoire de Tours. Hist. de France, Liv. VI. p. 299. From the description it appears to have been a meteor.
[10] Collection Academique, P. Etrang. VI. 507.
[11] Encyclopedique Methodique — Physique I. 341.
[12] Pharus sive de Prodigiis Ignis Cælest, p. 32.

778.		Lycosthenes and Frobes.
"		Mairan, Pilgram, and Acad. Coll.
786.	Dec.	Quetelet,[1] and Boguslawski.
800.		Frytschius and Frobes.
803.?		Lycosthenes, Frobes, and Chasles.
806.		Ado, Frobes, and Pilgram.
807.	Mar. 3.	Bouquet, Pilgram, and Quetelet.
808.	Feb. 2.	Lycosthenes, Frobes, Mairan,[2] and
"	" 2.	Academical Collection.
808.?	Aug. 14.	Academical Collection.
827.		Bouquet, Pilgram, and Quetelet.
828.		Pilgram.
836.		Pertz[3] and Quetelet.
839.	Feb.	Bouquet, Quetelet, and Boguslawski.
"	Mar. 30.	Pertz, Quetelet, and Boguslawski.
840.	April 2.	Bouquet, Pertz, and Pilgram.
"	" 2.	Quetelet and Boguslawski.
842.	Mar.	Bouquet, Pertz, Quetelet, Bogusl.
"	Mar. 18.	Pertz, Bouquet, Quetelet, Bogusl.
"	May 6.	Pertz, Bouquet, Quetelet, Bogusl.
"	x.	*Rome.* Tylkowsky. Frobes.
848.	Dec. 2.	Pertz, Bouquet, Quetelet, Bogusl.
849.	Jan. 2.	Pertz, Bouquet, Quetelet, Bogusl.
855.	Oct. 17.	Pilgram.
859.	Aug.	Leibnitz,[4] Frobes, Mairan, Pilgram.
"	Sept.	Leibnitz, Frobes, Mairan, Pilgram.
"	Oct.	Leibnitz, Frobes, Mairan,[5] Pilgram.
861.	Mar. 10.	Bouquet, Pertz, Quetelet, Bogusl.
869.		Pilgram.
870.	Bouquet,[6]	Quetelet, Pilgram, Boguslawski.
871.	Aug. 14.[7]	Lycosthenes, Frytschius, Frobes.
"	" 14.	Mairan, Chasles, Boguslawski.
917.		Bouquet, Quetelet, and Boguslawski.
918.	Feb. 7.	Bouquet, Duchesne,[8] Quetelet, Bogusl.
919.	Feb. 7.	Pertz, Quetelet, and Boguslawski.
927.	March.	Quetelet[9] and Boguslawski.
930.	Feb. 19.	*France.* Lycosthenes, Mairan, Frobes.
930.	Feb. 19.	Acad. Coll. Chasles, Boguslawski.
937.	Feb. 14.	Bouquet, Duchesne, Pertz, Quetelet.
940.?	Dec.	Bouquet, Quetelet and Boguslawski.
956.	Sept. 7.	Frobes,[1] Mairan and Acad. Coll.
970.		Lycosthenes, Pilgram, and Boguslawski.[2]
978.	Oct. 28.	Frytschius, Frobes, Mairan,[3] and P.
979.	Nov. 2.	Lycosthenes, Wolffius, and Frobes.
		Zahn, Mairan,[4] Acad. Coll. and Quetelet.
992.	Oct. 21.	Pilgram.
"	Dec.	Calvisius and Mairan.
993.	Jan. 6.	Short[5] and Mairan.
"	Dec. 26.[6]	Leibnitz, Frobes, Mairan, Pilgram.
998.	Dec. 19.	Lycosthenes, Frobes, Mairan, Acad.
1014.	Nov. 2.	Frytschius, Frobes, Mairan, Acad.
"	Dec. 29.	Boué,[7] and Acad. Coll.
1039.	April 12.	Lycosthenes, Frobes, Mairan.
"		Pilgram, Acad. Coll. and Chasles.[8]
1041.		Frytschius and Frobes.
1093.	Jan. 13.	Pilgram.
1095.	Feb. 24.	Godin,[9] Mairan, and Pilgram.
1096.	Mar. 9.	Wolffius, Frobes,[10] and Mairan.
"	" 9.	Pilgram and Acad. Coll.
1098.	Sept. 29.	Ingram[11] and Pilgram.?
"	Oct. 3.	Lycosthenes, Frobes, Mairan, Acad.
1099.	Mar. 2.	Lycosthenes, Frobes, Mairan, Acad.
1104.		Frytschius, Lycosthenes, Frobes.
1105.	Dec. 29.	Short, Mairan, and Acad. Coll.
1106.	Feb. 19.[12]	*Italy.* Lycosthenes, Frobes, Mairan.
"	" 19.	Pilgram, Acad. Coll. and Quetelet.
1114.		Frytschius and Frobes. (Doubtful.)
1115.	April 24.	Lycosthenes, Frobes, Mairan, Acad.
1116.[13]		Lycosthenes, Frobes, Pilgram, and Chasles.
1117.	Feb. 22.[14]	*Liege.* Lycosthenes and Frobes.

[1] He quotes Bouquet. Recueil des Historiens des Gaules., III. 139 et V. 72.

[2] Mairan thinks it uncertain whether this appearance was in 808 or 809. Traité, p. 190.

[3] Quetelet quotes his Monumenta Germaniæ Historicæ, II. 226.

[4] Miscellanea Berolinensia ad Incrementum Scient. I. 137.

[5] Mairan quotes the Annals of St. Bertin for the Luminous Phenomena of this year. Boguslawski ranks them as star-showers.

[6] Pendant plusieurs nuits le ciel est rouge comme du sang: &c.

[7] This is the date to which Mairan reduces IV. Idus Aug.

[8] Historiæ Francorum Scriptores. III. 474.

[9] He quotes Reiffenberg. Mém. de l'Acad. Brux. VII. 63.

[1] Baluzius. Chronic. Floriar. p. 305.

[2] This is the appearance which Frobes assigns to the year 971.

[3] Mairan (p. 191.), quotes Le Chronique Hirsaugiense de l'Abbe Trithème. The date here given is probably *in old style.*

[4] Mairan quotes the Chronique de Liechtenaw. (Urspergensis.) The original date is V. Kal. Nov.

[5] A General Chronological History of the Air, Weather, etc. II. 178.

[6] Probably *Old Style.*

[7] Sitzungsberichte der Kaiserl. Akad. Wien. XXII. 13.

[8] Boguslawski is probably correct in not regarding this as an aurora.

[9] Mém. de l'Acad. Paris, 1723, p. 296. The date is probably in *old style.*

[10] In Chronico Urspergens. (Liechtenaw,) pp. 240 et 245.

[11] The Saxon Chronicle. pp. 317–8.

[12] This was a star-shower and not an aurora.

[13] We may doubt with Boguslawski whether this was an aurora.

[14] In Chronico Urspergens. (Liechtenaw,) p. 274.

1117.	Feb.	22.	Mairan, Pilgram, and Acad. Coll.
"	Nov.	*x.*	Short.
"	Dec.	*x.*	Short.
"	"	16.	Ingram. [Saxon Chronicle. p. 338.]
1117.	Dec.	26.	*Palestine.* Lycosthenes and Frobes.[1]
"	Mairan, Acad. Coll. Chasles, Boguslawski.		
1118.	Jan.	13.	Pilgram.
"	Dec.	19.	Lycosthenes, Mairan,[2] and Boué.
1120.	*Leodium.*		Lycosthenes, Frytschius, Frobes.
1122.	Dec.	7.	Ingram.
1132.	Jan.	11.	Ingram.
1150.			Pilgram.
1157.			Lycosthenes, Frobes, and Pilgram.
"			Chasles and Boguslawski.
1180.			Pilgram.
1188.	Dec.	20.	*Canterbury.*[3] Gervasius.
1192.			Pilgram.
1193.	Jan.		Short.
"	Feb.		Short.
"	Nov.		Short.
1200.	Aug.	19.	Baluzius,[4] Frobes, Mairan, Acad.
1203.	April	1.	Pilgram, Pfaff,[5] Boguslawski.
1204.			Pilgram.
1251.			Frobes.[6]
1262.			Pilgram.
1269.	Dec.	13.	Lycosthenes, Cromerus,[7] Frobes.
"	"	13.	Mairan, Acad. Coll. Boguslawski.
1280.			Frytschius and Frobes.
1307.	Mar.	6.	Lycosthenes, Frobes, and Mairan.
"	"	6.	Acad. Coll. Chasles, Boguslawski.
1309.?			Lycosthenes, Chasles, and Bogusl.
1325.	May	30.	*Florence.*[8] Frobes, Mairan, Acad.
1351.	Dec.		Lycosthenes, Frobes,[9] and Pilgram.
or 2.	"		Chasles and Boguslawski.
1352.	Oct.	30.	Franciscus, Frobes, Mairan, Acad.
1353.	Aug.	19.	Franciscus, Frobes, and Mairan.
"	"	19.	Pilgram and Acad. Coll.
1354.	Mar.	9.	Lycosthenes, Franciscus Frobes.
1554.	Mar.	9.	Mairan and Acad. Coll.
1361.	Dec.	12.	Pilgram.
1375.			Frytschius, Lycosthenes, and Frobes.
"			Chasles and Boguslawski.
1399.			Pilgram.
1437.	Mar.	16.	Pilgram.
1446.	Feb.	5.	*Lenzburg*, &c. Lycosthenes, Frobes.[1]
"	"	5.	Mairan, Acad. Coll. and Boguslawski.
1461.	July	23.	Mairan[2] and Pilgram.
1465.	Nov.	18.	Mairan and Pilgram.
1499.	May	30.	*Lucerne, Switz.*, Lycosthenes.
"	"	30.	Frobes, Mairan, and Acad. Coll.
1514.	Jan.	22.[3]	Lycosthenes, Frobes, Mairan, Acad.
1518.	Jan.	3.	*Saxony.* Lycosthenes.
"	"	3.	Frobes, Mairan, and Acad. Coll.
1518.	*x.*		Cromerus and Frobes.
1520.	Sept.	13.	*Vienna and Erfurt.* Lycosthenes.[4]
"	Frobes, Mairan, Pilgram, Acad. Coll. Bogusl.		
"	Dec.	2.	Frobes, Mairan, and Acad. Coll.[5]
1527.[6]	Aug.	11.	Boué.
"	Oct.	20.	*Westrich.* Lycosthenes, Frobes.
"	"	20.	Mairan, Pilgram,[7] and Acad. Coll.
"	Dec.	11.	Boué.
1529.	*x.*		*Ulyxibona.* [*Lisbon?*] Nihusius, Frobes.
"	Jan.	18.	*Germany.* Lycosthenes, Meurerus.
"	Frobes, Mairan, Acad. Coll. Boguslawski.		
1531.			*Lisbon, Portugal.* Lycosthenes.
"			Frobes and Boguslawski.
1532.	*Innspruck.* Lycosthenes, Frobes,[8] Pilgram.		
1534.	June	12.	*Schleswig, Holstein.* Lycosthenes.
"	Finceleus, Frobes,[9] Mairan, and Acad. Coll.		
1535.	May	26.	*Lausitz.* Lycosthenes, Frobes.
"	"	26.	Mairan, Acad. Coll. Boguslawski.
"	*x.*		*Weimar.* Lycosthenes, Nihusius, Frobes.

[1] Compt. Rend. VII. 709.

[2] Mairan quotes this example from Lycosthenes, but it is probably the same as the aurora of Dec. 26, 1117. Traité &c., p. 192.

[3] Splendor magnus visus est in Cantuariâ nocte mediâ XIII. Kal. Jan. Twysden's Decem. Scriptores. I. 1538.

[4] Miscellan. Chronicon Cremonense. Lib. II. 307.

[5] Würtemberg Jahrbuch fur. Vaterland. Geschichte. 1850. I. 80.

[6] Mairan does not rank this among the auroras.

[7] De Rebus Gestis Polon. Lib. IX. This is the same aurora as Boué ascribes to Dec. 6.

[8] Franciscus. Der Wunderreiche Ueberzug unsrer Nieder-Welt &c.

[9] See Traité de l'Aurore Boreale par Mairan, p. 183.

[1] On this phenomenon Frobes remarks: "Dubium equidem, nisi fallor, propter ipsius narrationis conditionem, videtur, debeantne pro *Aurora Boreali*, an pro *Tempestate quidam sonora et fulgurante* haberi, quorum hic mentio sit, nocturna cæli spectacula."

[2] This date, probably in *old style*, is from the Chronique de Louis XI., p. 12.

[3] This was not probably an aurora.

[4] Weidler. Commentat. de Aurora Boreali, p. 64.

[5] Urstisius Annal. Bas. Lib. VII. C. 9. and Wagner. Historia Nat. Helvetiæ Curiosa., p. 363.

[6] Ejusmodi visa (acies in cælo dimicantes) scribit Melancthon in Germania ab anno 1524 ad 1548 saepissime spectata. Tylkowsky. Physica Curiosa. P. III., p. 176.

[7] In Pilgram and the Acad. Coll. the date is Oct. 11.

[8] Fincelius. De Miraculis. Jonston. Thaumatographia Natur. Class III. Cap. 12.

[9] Teubner. De Armorum Militumque Simulacris, &c.

1536. Feb. 16. *Spain.* Fincelius, Lycosthenes.
" " 16. Frobes, Mairan, and Acad. Coll.
1537. Feb. 10. *Italy.* Fincelius, Lycosthenes, &c.
" " 10. Frobes, Mairan and Acad. Coll.
1538. *Germany.* Lycosthenes, Frobes,[1] Pilgram.
1541. Jan. 3. *Germany.* Lycosthenes, &c.
" " 3. Frobes, Mairan, and Acad. Coll.
1542. *Wurtemberg.* Lycosthenes, Wolffius.
" Frobes and Boguslawski.[2]
1543. May 13. *Pfortzheim.* Lycosthenes, Frobes.
" " 13. Mairan, Acad. Coll, Boguslawski.[3]
1545. Feb. *x.* *Saxony.* Lycosthenes, Boguslawski.
" April 7. *Poland.* Lycosthenes, Franciscus, &c.
" " 7. Frobes, Mairan, and Acad. Coll.
1546. Feb. 19. *Meissen.* Lycosthenes, Frobes.
" " 19. Mairan, Acad. Coll. Boguslawski.
" *Hungary.* Fincelius, Franciscus, Liebknecht.
1547. July 31. *Helvetia.* Lycosthenes, Fincelius.
" " 31. Frobes, Mairan, and Acad. Coll.
" Oct. 10. *Saxony.* Lycosthenes, Fincelius.
" " 10. Frobes, Mairan, and Acad. Coll.
1548. Nov. 15. *Saxony.* Decimator,[4] Milichius.[5]
" " 15. Frobes, Mairan, and Acad. Coll.
1549. April. *Padua.* Toaldo.[6]
" Sept. 30. Kirch, Mairan, and Acad. Coll.
1551. Feb. 6. *Lisbon,* Lycosthenes, Frobes.
" " 6. Mairan, Acad. Coll. Boguslawski.
" Sept. 11. Kirch, Mairan, and Acad. Coll.
" Oct. 1. *Wittemberg.* Eberus,[7] Schmidt.
" Frobes, Fincelius, Mairan, and Acad. Coll.
1554. Feb. 10. *Chalons.* Lycosthenes, Frytschius.
" " 10. Frobes, Mairan, and Acad. Coll.
" Aug. 2. *Bohemia.* Frytschius, Lycosthenes.
" " 2. Mairan, Pilgram, and Boguslawski.
" Aug. 14. *Stolpen.* Lycosthenes, Fincelius, B.
" Aug. 21. Kirch, Mairan, and Acad. Coll.
1555. Mar. 22. *Thuringen.* Lycosthenes, Frobes.
" " 22. Mairan, Acad. Coll. Boguslawski.
" Sept. 2. Kirch, Mairan, and Acad. Coll.
1556. Jan. 20. *Bavaria.* Lycosthenes, Frobes.
" " 20. Mairan. Acad. Coll. Boguslawski.
" Sept. 14. *Cüstrin.* Fincelius and Lycosth.
" " 14. Mairan, Pilgram. Acad. Coll. B.

[1] Maiolus. Dierum Canicularium, Colloq., I. 32.
[2] Cardan. De Dæmon.
[3] Schmidt. In Chron. Cygn., II. 337. Lehmann. In Chron. Misn., p. 399.
[4] Epit. Meteor., p. 27.
[5] Commentar. in Plinium. p. 209.
[6] Rozier. Journ. de Phys., &c., XXIV. 7–8.
[7] Calendario Histor., &c. Multi crederent ardere vicinum pagum Teucheln.

1557. Mar. 26. *Voigtland.* Lehmann.
" " 26. Frobes, Mairan, and Acad. Coll.
" Dec. 4. *Italy.* Franciscus.
" " 4. Frobes, Mairan, and Acad. Coll.
1560. Feb. 11. *London.* Halley,[1] Pilgram.
" *Bohemia and Saxony.* Thompson,[2] Boguslawski.
" April 19. Kirch, Mairan, and Acad. Coll.
1561. Jan. 6. *Switzerland.* Maraldi,[3] Pilgram.
" *Germany.* Acronius, Wagner, Frobes,[4] A. Coll.
" Jan. 6.[5] Kirch, Mairan, and Acad. Coll.
" " 7. *Zurich, Switzertand.* Wolf.[6]
" Mar. 8. *Eisleben.* Frobes, Mairan, A. Coll.
" " 13. Kirch, Mairan, and Acad. Coll.
1562. *Germany.* Frytschius, Frobes.[7]
1563. Jan. 23. *Zurich.* Wolf.
" Feb. 4. *Zurich.* Wolf.
1564. Feb. 27. Gemma.[8] Kirch, Mairan, Pilgram.
" Sept. 9. Kirch, Mairan, and Acad. Coll.
" Oct. 16. *England.* Camden, Stow,[9] Thomp.
" " 16. Gemma, Frobes, Mairan, Acad. Coll.
" Nov. 6. Kirch, Mairan, and Acad. Coll.
" " 7. *Zurich.* Wolf.
1565. Dec. 5. Olai,[10] Celsius,[11] Mairan, Acad. Coll.
" " 5. *Germany.* Garcaeus,[12] Frobes.
1567. Feb. 16. Kirch, Mairan, and Acad. Coll.
" April 26. Kirch, Mairan, and Acad. Coll.
1568. April 4. *Franconia. Lausitz.* Rivander.
" " 4. Frobes, Mairan, and Acad. Coll.
" April 11. *Franconia. Lausitz.* Rivander.
" " 11. Frobes, Mairan, and Acad. Coll.
" Oct. 4. Gemma, Mairan, and Pilgram.
1569. Jan. 4. *Franconia. Lausitz.* Rivander.
" " 4. Frobes, Mairan, and Acad. Coll.
" Mar. 20. *Zurich.* Wolf.
1571. Mar. 12. Kirch, Mairan, and Acad. Coll.
" " 13. Kirch, Mairan, and Acad. Coll.
" " 14. Schmidt, Lehmann, and Frobes.

[1] Phil. Trans. No. 347. Vol. XXIX., p. 417.
[2] Annals of Philosophy, IV. 427.
[3] Mém. de l'Acad. 1721, p. 242.
[4] Mairan gives this erroneously as Jan. 6, 1560.
[5] Mense Decembri late per Germaniam ante solis ortum ignis fulsit adeo, ut plurimi ex oppidis et villis auxilio vicinis suis undique occurrerent, quod eorum domos conflagrare arbitrarentur. Boguslawski. Pogg. Ann. Erganzungsband IV. nach Band XC.
[6] Vierteljahr. Zurich, I. 196.
[7] Rivander. In Chron. Dierum Festorum II. 5.
[8] De Prodigiosa Specie Utraque Comëtae, &c., p. 42.
[9] A General Chronicle of England, p. 658.
[10] Calend. ad annos 1588 et 1589.
[11] Præfat. Observationum de Lumine Boreali.
[12] Meteorologia.

1571. Mar. 14. Kirch, Mairan,[1] and Acad. Coll.
" " 30. Pilgram.
1572. Jan. 22. Kirch, Mairan, and Acad. Coll.
" Jan. 27. *Zurich.* Wolf.
" Mar. 11. Kirch and Mairan.
" " 12. Kirch, Mairan, and Acad. Coll.
" " 13. Kirch, Mairan, Pilgram, Acad. Coll.
" " 14. Kirch, Mairan, and Acad. Coll.
" April 26. *Constantinople.* Frobes, M'n., A. C.
1573. Jan. 1. *Befort.* Berk, Frobes, and Mairan.[2]
" Feb. 6. Gemma, Mairan, and Pilgram.
" " 16. *Zurich.?* Wolf.
" " 23. *Zurich.?* Wolf.
" April 9. *France.* Scheuchzer.
" " 9. Frobes, Mairan, and Acad. Coll.
" " 21. Kirch, Mairan, and Acad. Coll.
" Nov. 28. *Liefland, Russia.* Frobes, M'n., A.
1574. Jan. *x.* Gemma, Mairan, and Pilgram.
" Aug. 30. *Zurich.* Wolf.
" Nov. 24. *England.* Camden,[3] Stow.
" " 24. Frobes, Mairan, and Acad, Coll.
" " 25. *England.* Camden, Stow,[4] Kirch.
" " 25. Frobes, Mairan, and Acad. Coll.
" Dec. 28. *Zurich.* Wolf.
1575. Feb. 23. *Brabant.* Gemma, Frobes, Mairan.
" " 23. Pilgram, Acad. Coll. Thompson.
" Oct. 8. *Zurich.* Wolf. Gemma.
" " 8. Gemma, Frobes, and Thompson.
" " 8. Kirch, Mairan,[5] and Acad. Coll.
1576. Jan. 1. *Zurich.* Wolf.
" " 2. *Zurich.* Wolf.
" Feb. 27. *Zurich.* Wolf.
" June 4. *Zurich.* Wolf.
" Dec. 4. *Zurich.* Wolf.
" " 15. *Zurich.* Wolf.
" " 16. *Zurich.* Wolf.
" " 17. *Zurich.* Wolf.
" " 18. *Zurich.* Wolf.
1577. Dec. 28. Kirch, Mairan, Moestlin,[6] Acad. Coll.
1580. Mar. 16. *Baknang, Wurtemberg.* Moestlin, F's.
" " 16. Mairan, Pilgram, and Acad. Coll.
" April 16. *Wurtemberg.* Moestlin, Frobes, M'n.
" " 16. Halley, Pilgram, and Acad. Coll.
" " 19. *Wurtemberg.* Moestlin, Frobes, M'n.
" " 19. Halley, Pilgram, and Acad. Coll.

[1] This is given erroneously by Mairan as March 15.
[2] Scheuchzer. Biblioth. Scrip. Hist. Nat. p. 75.
[3] Rerum Anglicarum et Hybernicarum Annales, p. 263.
[4] A General Chronicle of England, p. 678.
[5] Mairan quotes this aurora from Frobes, as upon Sept. 28.
[6] Consideratio et Observatio cometæ aetherei, &c.

1580. Sept. 5. Boué.
" " 20. *Wurtemberg.* Moestlin, Frobes, M'n.
" " 20. Halley, Kirch, Pilgram, Acad. Coll.
" Oct. 1. *Wurtemberg.* Moestlin, Frobes, M'n.
" " 1. Halley, Pilgram, and Acad. Coll.
" " 11. Kirch and Mairan.
" Dec. 20. *Zurich.* Wolf.
" " 26. Halley, Mairan, Moestlin, Pilgram.
1581. Jan. 5. *Wurtemberg.* Moestlin, Frobes, M'n.
" " 5. Halley, Pilgram, and Acad. Coll.
" " 17. *Germany.* Frobes, Kirch, Mairan.
" Feb. 26. *Wurtemberg.* Moestlin, Frobes, M'n.
" " 26. Halley, Pilgram, and Acad. Coll.
" April 12. Kirch, Mairan, and Acad. Coll.
" " 14. *Brabant.* Frobes, Mairan, Acad. C.
" " 16. *Zurich.* Wolf, Kirch, Mairan, Acad.
" Sept. 5. Kirch, Mairan, and Acad. Coll.
" Oct. 24. *Zurich.* Wolf.
" Nov. 18. Kirch, Mairan, and Acad. Coll.
" " 24. Kirch, Mairan, and Acad. Coll.
1582. Mar. 16. *Zurich.* Wolf. *Meissen.* Lehmann.
" " 16. Frobes, Kirch, Mairan, Acad. Coll.
" " 17. Kirch, Mairan, and Acad. Coll.
" " 18. *Prussia.* Hennenberger.[1]
" " 18. Frobes, Kirch, Mairan, Acad. Coll.
" April 10. *Zurich.* Wolf, Kirch, Mairan, Acad.
" " 11. Kirch and Mairan.
" Nov. 7. *Zurich.* Wolf.
1583. Mar. 23. Kirch, Mairan and Acad. Coll.
" " 30. *Zurich.* Wolf.
" April 12. *Zurich.* Wolf, Kirch, Mairan, A. C.
" Sept. 12. Kirch, Mairan and Acad. Coll.
" Oct. 12. *Zurich.* Wolf.
1584. Feb. 29. Kirch, Mairan, and Acad. Coll.
1585. Dec. 5. Kirch, Mairan, and Acad. Coll.
" " 22. Kirch, Mairan, and Acad. Coll.
1586. Feb. 13. *Brandenberg.* Frobes.[2]
" " 13. Kirch, Mairan, and Acad. Coll.
1588. Jan. 5. *Upsal.* Celsius, Frobes, M'n., A. C.
" Feb. 14. Hondorff, Frobes, Mairan, A. C.
" " 15. Hondorff, Frobes, Mairan, A. C.
" " 16. Hondorff, Frobes, Mairan, A. C.
" Dec. 16. Kirch, Mairan, and Acad. Coll.
1589. Jan. 12. Kirch, Mairan, and Acad. Coll.
1590. Mar. 8. *Berne.* Wolf.
" " 9. *Zurich.* Wolf.
" April 12. Kirch, Mairan, and Acad. Coll.
1591. Mar. 30. Kirch, Mairan, and Acad. Coll.

[1] Erklarung der Land-Tafel von Preussen.
[2] Hondorffii Calendarium Sanctorum, &c., p. 102.

1592.	Mar.	29.	Frobes, Mairan, and Acad. Coll.
1593.	Oct.	24.	Kirch, Mairan, and Acad. Coll.
"	"	25.	Kirch, Mairan, and Acad. Coll.
"	"	26.	Kirch, Mairan, and Acad. Coll.
"	"	27.	Kirch, Mairan, and Acad. Coll.
"	"	28.	Kirch, Mairan, and Acad. Coll.
"	"	29.	Kirch, Mairan, and Acad. Coll.
"	"	30.	Kirch, Mairan, and Acad. Coll.
1596.	April	26.	Kirch, Mairan, and Acad. Coll.
1599.	Aug.	17.	Schmidt, Lehmann, F., M., A. C.
1600.	Dec.	28.	Schmidt, Frobes, Mairan, and Acad.
1602.	June	20.	*Zurich.* Wagner,[1] Frobes, Mairan.
1603.	Sept.	17.	*Zurich.* Wagner, Frobes, Mairan,
"	Nov.	6.	*Zurich.* Wolf. [Acad. Coll.
1605.?	Nov.	17.	*Mayence.* Serrarius.[2] Schmidt, F.
"	"	17.	*Paris.*[3] Mairan, Pilgram, and Acad.
"	Dec.	20.	*Mayence.* Serrarius. Pilgram.
1606.	Sept.	13.[4]	Frobes, Mairan, and Acad. Coll.
"	"	15.[4]	Frobes,[5] Mairan, and Acad. Coll.
1607.	Nov.	28.	Serrarius,[6] Frobes, Mairan, Acad.
1608.	Nov.	27.	*Kauffbeuren, Suabia.* Bernegger.
"	"	27.	Frobes, Mairan,[7] and Acad. Coll.
1609.	Mar.	*x.*	*Leuwarden.* Nihusius. Frobes.
"	"	11.	Academy's Collection.
"	"	26.	Kirch, Mairan, and Acad. Coll.
1612.	Aug.	6.	Kirch, Mairan, and Acad. Coll.
1614.	July	5.	*Basle.* Wagner, F's., M. and A. C.
1615.	Oct.	26.	*Paris.* La Motte le Vayer, Mairan,
1621.	Feb.	3.	Acad. Coll. [and Pilgram.
"	Mar.	3.	Kirch and Mairan.
"	Sept.	12.	*Zurich.* Wolf. *Neuchatel.*[8] Pilgram.
"	"	12.	Liebknecht, Frobes, Kirch, Mairan,
"	Sept.	22.	*France.* Gassendi.[9] [Thompson, A.C.
"	"	22.	Frobes, Mairan,[10] and Acad. Coll.
"	Oct.	13.	*Zurich.*? Wolf.
1622.	Jan.	24.	Kirch, Mairan, and Acad. Coll.
"	June	10.	*Zurich.* Wolf.
1623.	Jan.	12.	Kirch, Mairan, and Acad. Coll.
"	"	16.	Kirch, Mairan, and Acad. Coll.
1623.	Jan.	17.	Kirch, Mairan, and Acad. Coll.
"	Feb.	18.	Kirch, Mairan, and Acad. Coll.
"	May	13.	*Joachim, Bohemia.* Frobes, M., A. C.
"	"	17.	Lehmann. Frobes, Mairan, and
"	Nov.	17.	*Germany.* Kepler.[1] [Acad. Coll.
"	Dec.	11.	Kirch, Mairan, and Acad. Coll.
1624.	April	7.	*Joachim.* Lehmann, F., M., A. C.
"	May	12.	*Anhalt.* Frobes, Mairan, Acad. Coll.
"	June	7.	*Holland.* Franciscus.
"	"	7.	Frobes,[2] Mairan, and Acad. Coll.
1625.	Sept.	7.	Mairan, Short, and Acad. Coll.
"	"	17.	Kirch, Mairan, and Acad. Coll.
"	"	30.	Mairan, Short, and Acad. Coll.
"	Oct.	10.	Kirch, Mairan, and Acad. Coll.
"	Nov.	3.	Kirch, Mairan, and Acad. Coll.
1626.	Feb.	5.	Kirch, Mairan, and Acad. Coll.
"	May	28.	Kirch, Mairan, and Acad. Coll.
"	June	26.	Mairan, Short, and Acad. Coll.
"	Aug.	8.	Kirch, Mairan, and Acad. Coll.
"	Sept.	17.	Kirch, Mairan, and Acad. Coll.
"	"	24.	Kirch, Mairan, and Acad. Coll.
1627.	Jan.	17.	*Joachim, Bohemia.* Lehmann.
"	"	17.	Frobes, Mairan, and Acad. Coll.
"	"	21.	*Joachim.* Lehmann.
"	"	21.	Frobes, Mairan, and Acad. Coll.
1628.	Jan.	*x.*	Kirch, Mairan, and Acad. Coll.
"	April	27.	Pfaff. Boguslawski.[3] Boué.
"	"	30.	Pfaff. Boguslawski. Boué.
"	Dec.	20.	Mairan, Short, and Acad. Coll.
"	"	26.	Mairan, Short, and Acad. Coll.
"	"	28.	Mairan, Short, and Acad. Coll.
"	"	30.	Kirch, Mairan, and Acad. Coll.
1629.	Jan.	5.	Kirch, Mairan, and Acad. Coll.
"	"	11.	Kirch and Mairan.
"	Mar.	*x.*?	*Meissen.* Jonston.[4] Frobes.
"	June	*x.*	*Zurich.* Wagner. Frobes.
"	Aug.	21.	Kirch, Mairan, and Acad. Coll.
"	Sept.	19.	Kirch, Mairan, and Acad. Coll.
"	"	20.	Kirch, Mairan, and Acad. Coll.
"	"	21.	Kirch, Mairan, and Acad. Coll.
"	Oct.	1.	Mairan, Short, and Acad. Coll.
"	"	2.	Kirch, Mairan, and Acad. Coll.
"	"	16.	Mairan, Short, and Acad. Coll.
"	"	26.	Kirch, Mairan, and Acad. Coll.
"	"	29.	Mairan, Short, and Acad. Coll.
"	"	30.	Kirch, Mairan, and Acad. Coll.

[1] E Suizeri Chron. Helvet., p. 125.
[2] Epistolæ ad John Kepler, &c., p. 350.
[3] Journal du Regne de Henry IV. de P. de l'Etoile, II. 88.
[4] Mairan takes both these dates from Frobes *unchanged.*
[5] Frobes quotes, " Le Mercure François, &c., p. 82.
[6] Acta Erudit. Leipsic, 1719, p. 8.
[7] Mairan and Pilgram assign this aurora to Nov., 1607. Traité &c. p. 201.
[8] Bull. de l'Acad. Brux. V., 283.
[9] Oeuvres, II. 108.
[10] Mairan places this aurora on Sept. 21. Frobes intimates that this and the preceding record refer to the same aurora.

[1] Thompson's Meteorology, p. 350.
[2] Baudartius, Historia Eccles. et Polit. Lib. XVI.
[3] Würtemberg Jahrbuch fur 1850. I.
[4] Thaumatographia Naturalis, &c.

1630. Feb. 3. *Joachim.* Lehmann.
" " 3. Frobes, Mairan, and Acad. Coll.
" " 4. *Spitzbergen.* Boué, Mairan, Acad.
" " 4. *Tubingen.* Schickard, Frobes, Kirch.
" June 18. Pfaff, Boguslawski, Boué.
" " 19. Plaff, Boguslawski, Boué. [bow.
1732. Nov. 12.[1] *Paris.* Godin. *Copenhagen.* Horre-
1633. May 28. Lehmann, Frobes, M., and A. C.
" June 23. Lehmann, Frobes, M., and A. C.
" Dec. 30. *Spitzbergen.* Zorgdrager.[2]
" " 30. Frobes and Mairan. Acad. Coll.
1634. Jan. 3. *Spitzbergen.* Zorgdrager.
" " 3. Frobes, Mairan, and Acad. Coll.
" Feb. 1. *Spitzbergen.* Zorgdrager.
" " 1. Frobes, Mairan, and Acad. Coll.
" " 11. *Wolckenstein.* Lehmann. Frobes. M.
1637. Aug. 20. *Meissen and Bohemia.* Lehmann.
" " 20. Frobes, Mairan, and Acad. Coll.
1638. Jan. 6. *Meissen* and *Bohemia.* Lehmann.
" " 6. Frobes, Mairan, and Acad. Coll.
1640. Jan. 27. Lehmann, Frobes, Mairan, and
1643. Nov. 8. Boguslawski.[3] Boué. [Acad. Coll.
" " *x.* *Saxony.* Franciscus, Lehmann, F.
1644. Mar. *x.* *Annaberg, Saxony.* Lehmann, F.
1645. April 27. *Dunckelspield.* Franciscus.
" " 27. Frobes, Mairan, and Acad. Coll.
1646. Nov. *x.* *Silesia.* Franciscus.
" " *x.* Frobes, Mairan, and Acad. Coll.
1650.? Jan. 17. *Basle.* Wagner.
" " 17. Frobes, Mairan, and Acad. Coll.
1654. Mar. 5. *Leipsic.* Franciscus.
" " 5. Frobes,[4] Mairan, and Acad. Coll.
1655. July 9. *Poland.* Tylkowsky.
" " 9. Frobes, Mairan, and Acad. Coll.
1757. Jan. 13. Kirch, Mairan, and Acad. Coll.
" April 13. *Meissen.* Lehmann.
" " 13. Frobes, Mairan, and Acad. Coll.
1660. Dec. *x.* *Hungary.* Lehmann. Frobes.
1661. Jan. 30. *Glarus and Vadisvilla.* Wagner.[5]
" " 30. Frobes, Mairan, and Acad. Coll.
" April 16. *Prussia.* Schulzius. Franciscus.
" " 16. Frobes, Mairan, and Acad. Coll.
1662. Dec. 15. *Scheibenberg.* Lehmann.
" " 15. Frobes, Mairan, and Acad. Coll.
1663. Nov. 9. *Scheibenberg.* Lehmann.

[1] Encyc. Method. I. 453.
[2] De Piscatu Groenland, Leipsic, 1723, p. 320.
[3] Schles. Chron., Nov. 12, 1841.
[4] Limner. De Nundin. Lips. Relat.
[5] This was probably a meteor.

1663. Nov. 9. Frobes, Mairan, and Acad. Coll.
1664. April 18. *Scheibenberg.* Lehmann.
" " 18. Frobes, Mairan, and Acad. Coll.
1665. April 18. *Baltic Sea.* Scheffer. Franciscus.
" " 18. Frobes, Mairan, and Acad. Coll.
" Aug. 23. *Upsal.* Celsius. Frobes, Mairan,[1]
1666. Jan. 31. *Scheibenberg.* Lehmann. [A. Coll.
" " 31. Frobes, Mairan, and Acad. Coll.
1671. Nov. 29. *Bischofszell, Switz.* Wagner.
" " 29. Frobes, Mairan, and Acad. Coll.
1672. Jan. *x.* *Cracow.* Cromerus.
" " *x.* Frobes, Mairan,[2] and Acad. Coll.
1676? Feb. 3. *Zurich.* Frobes, Mairan, Acad. C.
" Mar. 2.? *Zurich.* Frobes, Mairan, Acad. Coll.
1677. Nov. 18. *Rostock.* Franciscus.
" " 18. Frobes, Mairan, and Acad. Coll.
" Dec. 12. *Annaberg, Saxony.* Lehmann.
" " 12. Frobes, Mairan, and Acad. Coll.
1680. Sept. 30. *Chemnitz.* Lehmann.
" " 30. Frobes, Mairan and Acad. Coll.
1682. Nov. 7. *Dantzig.* Hevelius.[3]
" " 7. Frobes, Mairan, and Acad. Coll.
" Dec. 15. *Meissen.?* Waldschmidt.[4] Lehmann.
" " 15. Frobes, Mairan, and Acad. Coll.
1683. Jan. *x.* Frobes, Mairan, and Acad. Coll.
" Aug. 22. *Germany.* Weigelius,[5] Lehmann.
" " 22. Frobes, Mairan, and Acad. Coll.
1684. Mar. 28. *Meissen.* Lehmann.[6]
" " 28. Frobes, Mairan, and Acad. Coll.
" Nov. 23. *Meissen.* Lehmann.
" " 23. Frobes, Mairan, and Acad. Coll.
1685. April 26.? Lehmann, Frobes, Mairan, A. C.
1686. Feb. 2. *Mittelheim.* Moeren.[7] Frobes.
" " 2. Mairan, Pilgram, and Acad. Coll.
" June 1. Mairan, Short, and Acad. Coll.
" July 19. Mairan, Short, and Acad. Coll.
" Oct. 29. *Meissen.* Vulpius. Guettner.[8]
" " 29. Frobes, Mairan, and Acad. Coll.
1687.?[9] *Denmark.* Horrebow. Pilgram, Mairan.

[1] Acta Lit. Succiæ. II. 50.
[2] Mairan understands Frobes as meaning Jan. 1673.
[3] Acta Erudit. Leipsic, 1682, p. 391 et 1685, p. 141.
[4] Diss. Meteori Ignei in Aere nuper conspecti, &c.
[5] Von der Würkung des Gemüths, &c.
[6] This and the supposed aurora of Nov. 23 were probably meteors.
[7] Miscell. Curiosa. 1686. VII. 215.?
[8] Acta Erudita et Curiosa. XX. 716.
[9] Cassini states that the aurora appeared at the end of June and continued till July 10. Encyc. Method. — Physique, I. 352. Also Traité &c. par Mairan, pp. 35 et 203.

1690.	Oct.		Short and Mairan.
"	Nov.		Short and Mairan.
"	Dec.		Short and Mairan.
1692.	April	12.	Frobes, Mairan, and Acad. Coll.
"	May	22.	Lehmann, Frobes,[1] Mairan, Acad.
"	Sept.	14.	*Breslau.* Grebner.[2] Frobes.
1693.	Nov.	10.	Lehmann and Frobes.
"	"	10.	Mairan and Acad. Coll.
"	Nov.	22.	*Breslau.* Grebner, Frobes, Mairan,
1694.	Mar.	31.	*Breslau.* Grebner, Frobes, Mairan,
"	April	4.	*Breslau.* Grebner, Frobes, Mairan,
1695.	Oct.	5.	*Breslau.* Grebner, Frobes, Mairan,
"	"	12.	*Breslau.* Grebner, Frobes, Mairan,
"	"	31.	*Breslau.* Grebner, Frobes, Mairan,
"	Nov.	20.	*Breslau.* Grebner, Frobes, Mairan,
1696.	May	12.	*Breslau.* Grebner, Frobes, Mairan,
"	Sept.	26.	*Breslau.* Grebner, Frobes, Mairan,
"	Nov.	6.	*Breslau.* Grebner, Frobes, Mairan,
"	"	18.	*Breslau.* Grebner, Frobes, Mairan,
1697.	Aug.	18.	*Meissen and Holstein.* Lehmann.
"	"	18.	Frobes, Mairan, and Acad. Coll.
1698.	Feb.	24.	*Breslau.* Grebner, Frobes, Mairan,
"	"	26.	*Breslau.* Grebner, Frobes, Mairan,
"	May	18.	Frobes, Mairan, and Acad. Coll.
"	Sept.	30.	*Rossa.*[3]? Lehmann, Mairan, Frobes,
"	Nov.	15.	*Breslau.* Grebner, Frobes, Mairan,
"	"	27.	*Breslau.* Grebner, Frobes, Mairan,
"	Dec.	7.	*Breslau.* Grebner, Frobes, Mairan,
"	"	23.	*Breslau.* Grebner, Frobes, Mairan,
"	"	28.	*Breslau.* Grebner, Frobes, Mairan,
"	Jan.	3.	*Breslau.* Grebner, Frobes, Mairan,
"	Feb.	17.	*Breslau.* Grebner, Frobes, Mairan,
1699.	Feb.	23.	*Breslau.* Grebner, Frobes, Mairan,
"	"	25.	*Breslau.* Grebner, Frobes, Mairan,
"	April	17.	*Breslau.* Grebner, Frobes, Mairan,
"	"	20.	*Breslau.* Grebner, Frobes, Mairan,
"	"	21.	*Breslau.* Grebner, Frobes, Mairan,
"	"	28.	*Breslau.* Grebner, Frobes, Mairan,
"	June	18.	*Breslau.* Grebner, Frobes, Mairan,
1699.	June	26.	*Breslau.* Grebner, Frobes, Mairan,
"	July	23.	*Breslau.* Grebner, Frobes, Mairan,
"	July	26.	*Breslau.* Grebner, Frobes, Mairan,
"	Aug.	14.	*Breslau.* Grebner, Frobes, Mairan,
"	"	19.	*Breslau.* Grebner, Frobes, Mairan,
"	"	21.	*Breslau.* Grebner, Frobes, Mairan,
"	"	22.	*Breslau.* Grebner, Frobes, Mairan,
"	"	24.	*Breslau.* Grebner, Frobes, Mairan,
"	"	26.	*Breslau.* Grebner, Frobes, Mairan,
"	"	27.	*Breslau.* Grebner, Frobes, Mairan,
"	Sept.	16.	*Breslau.* Grebner, Frobes, Mairan,
"	"	17.	*Breslau.* Grebner, Frobes, Mairan,
"	"	18.	*Breslau.* Grebner, Frobes, Mairan,
"	"	19.	*Breslau.* Grebner, Frobes, Mairan,
"	"	21.	*Breslau.* Grebner, Frobes, Mairan,
"	"	22.	*Breslau.* Grebner, Frobes, Mairan,
"	"	24.	*Breslau.* Grebner, Frobes, Mairan,
"	Oct.	9.	*Breslau.* Grebner, Frobes, Mairan,
"	"	18.	*Breslau.* Grebner, Frobes, Mairan,
"	"	21.	*Breslau.* Grebner, Frobes, Mairan,
"	"	22.	*Breslau.* Grebner, Frobes, Mairan,
"	"	24.	*Breslau.* Grebner, Frobes, Mairan,
"	Nov.	10.	*Breslau.* Grebner, Frobes, Mairan,
"	"	15.	*Breslau.* Grebner, Frobes, Mairan,
"	"	18.	*Breslau.* Grebner, Frobes, Mairan,
"	"	21.	*Breslau.* Grebner, Frobes, Mairan,
"	"	23.	*Breslau.* Grebner, Frobes, Mairan,
"	"	24.	*Breslau.* Grebner, Frobes, Mairan,
"	Dec.	14.	*Breslau.* Grebner, Frobes, Mairan,
"	"	15.	*Breslau.* Grebner, Frobes, Mairan,
"	"	17.	*Breslau.* Grebner, Frobes, Mairan,[1]
1701.			*Valencia, Spain.* Rico.[2]
1702.	May	29.	*Abo, Finland.* Jechonius.[3]
"	"	29.	Frobes and Mairan.
1704.			Pilgram.

[1] Mairan places this by mistake on March 22. Traite &c., p. 471.

[2] In Diario Meteorol. Wratislav. p. 7, &c. In regard to the numerous observations of supposed auroras recorded by Grebner, between 1692 and 1700, Frobes remarks: "Dubium est, fateor, *noctemne* insigniter *serenam* (quæ siderea vocari passim hic solet) an *luminis borealis spectaculum* aliquod *noctis sublustris* vocabulo auctor significaverit. Sed nolui tamen interim quamquam dubias observationes hasce prorsus omittere: ne scilicet curatius hoc quicquid rei est, explorandi ansam mihi atque aliis denegasse videar," p. 62. Acad. Coll. is omitted for want of room on Grebner's dates, and on Sept. 30.

[3] Near *Freiburg.*

[1] Between 1700 and 1751, the *Collection Academique* appears to be merely a transcript from Mairan's catalogue of auroras, with occasionally an accidental error, mostly omissions. The auroras of Nov. *x.* 1709, and March *x.* 1711, are given as Nov. 11 and March 11. The auroras of April 11, 1716, April 10 and 11, 1717, of Oct. 11, 1718, of Feb. 11, 1719, of Feb. 11 and April 11, 1720, of Feb. 11, 1721, of Jan. 17, 1724, are all omitted. The auroras of May 1 and 3, 1728, are given as the aurora of May 13. An aurora on May 26, 1737, is interpolated, and the auroras of Nov. 26 and 30 of that year are omitted. The auroras which belong to March and April, 1741, are repeated for 1742, and the actual auroras of March, 1742, are omitted. Since the date of Mairan's catalogue, auroras are given for Feb. 4, 1759, at *Berlin* and *Freyhourg*, and for Feb. 8, 1759, at *Paris.*

[2] Mem. de l'Acad. Cienc. Madrid. III. 77.

[3] In dem Unvorgreiflichen Bedencken über das Zu Abau in Finland — am Himmel wahrgenomene Wunder-und Feuer-Zeichen.

1704.

Dec. 28. Frobes and Mairan.

1706.

Sept. or Oct. ——— Barret.[1]

1707.

Feb. 1. *Copenhagen.* Roemer. Mairan.[2]
" 2. *Copenhagen.* Roemer. Boué.
" 12. Frobes and Mairan.
Mar. 1. *Copenhagen.* Roemer.[3] Mairan.
" 6. *Berlin.* Kirch.[4] *Schomberg.* Seidelius.[5]
" 17. Frobes and Mairan.
" 18. Frobes and Mairan.
" 20. Frobes and Mairan.
" 31. *Upminster.* Derham. *Ireland.* Neve.[6]
Aug. 16. Frobes and Mairan.
" 18. Frobes and Mairan.
Oct. 21. *Berlin.* Kirch. Mairan.
" 27. Frobes and Mairan.
" 29. *Berlin.* Kirch. Mairan.
Nov. 24. Frobes and Mairan.
" 27. *Berlin.* Kirch. *Ireland.* Neve.[7]
" 27. Mairan and Thompson.

1708.

Aug. 20. *London.* Halley.[8] Mairan.
" 21. *London.* Halley.[9]
Sept. 15. *North Sea*, 66° *Lat.* Mairan.[10]
" 22. Frobes and Mairan.

1709.

Oct. 18. Frobes and Mairan.
Nov. *x.* Frobes and Mairan.
Dec. 19. Frobes and Mairan.

1710.

Sept. 17. *Paris, Vienna, and Pekin.*[11]
Nov. 26. *Giessen.* Liebknecht. Mairan.[12]
" 26. *Leipsic.* Pilgram.
Dec. 7. Frobes and Mairan.

1711.

Mar. *x.* *Giessen.* Pilgram. Frobes and Mairan.

1714.

Oct. 15. Frobes and Mairan.

[1] Phil. Trans., XXVI. 310.
[2] Miscell. Berolin., I. 127–131.
[3] Ibid., 131.
[4] Ibid., 132.
[5] Ibid., 129.
[6] Phil. Trans., XXVI. 310.
[7] Ibid.
[8] Phil. Trans., XXIX. 419.
[9] Ibid.
[10] Bruyn's Voyages, V. 299.
[11] Boué quotes Frobes.
[12] Acta Erud., 1711.

1716.

Mar. 15. ——— Pilgram.
" 17. *Berlin.* Kirch. *London.* Halley.[1]
" 17. *Cambridge, Eng.* Cotes.[2]
" 17. *Sweden.* Celsius. Frobes.
" 17. *Brest* and *Rouen.* Mairan.
April 11. *Berlin.* Kirch. *Paris.* Maraldi. Mairan.
" 11. Frobes, Pilgram, and Phil. Trans.
" 12. *Berlin.* Kirch. *Paris.* Maraldi.
" 12. Frobes, Mairan, Pilgram, and Phil. Trans.
" 13. *Paris.* Maraldi.[3]
" 13. Frobes, Mairan, Pilgram, and Phil. Trans.
" 20. *Giessen.* Liebknecht.[4]
May 1. Frobes and Mairan.
" 2. Frobes and Mairan.
" 3. Frobes and Mairan.
" 4. Frobes and Mairan.
" 5. Frobes and Mairan.
Dec. 15. *Paris.* Maraldi.[5] Frobes.
" 15. Mairan, Pilgram, and Reuss.
" 16. *Paris.* Maraldi.
" 16. Frobes, Mairan, and Pilgram.[6]

1717.

Jan. 6. *Paris.* Maraldi. Mairan and Pilgram.
" 9. *Paris.* Maraldi. Mairan and Pilgram.
" 10. *Paris.* Maraldi. Mairan and Pilgram.
" 11. *Paris.* Maraldi. Mairan and Pilgram.
Feb. 2. *Berlin.* Kirch. Mairan.
" 16. *Kent.* Barrell. Short.[7]
April 6. Frobes and Mairan.
" 9. Frobes and Mairan.
" 10. *Berlin.* Kirch. *London.* Folkes.
" 10. *Kent.* Barrell.[8]
" 10. Celsius, Frobes, Mairan, and Short.
" 11. Frobes and Mairan.
Aug. 10. Celsius and Mairan.
" 21. Frobes and Mairan.
" 31. *Berlin.* Kirch. Mairan.
Sept. 8. *Berlin.* Kirch. Mairan.
" 11. Celsius and Mairan.
" 20. ——— Pilgram.
Oct. 1. *Upsal.* Burman. Frobes and Mairan.[9]

[1] Phil. Trans., XXIX. 406, 407.
[2] Phil. Trans., XXX. 66.
[3] Mairan, p. 206.
[4] Acad. Nat. Curios., 1719, 153.
[5] Mémoires de l'Acad., 1717.
[6] Ibid.
[7] Phil. Trans., XXX. 584.
[8] Ibid.
[9] Acta Lit. Succiæ, II. 566; also Phil. Trans., XXXIII. 175.

1718.

Feb. 5. Frobes and Mairan.
" 14. *Sweden.* Celsius. Frobes and Mairan.
Mar. 4. *Berlin.* Kirch. Maraldi and Pilgram.
" 4. *Sweden.* Celsius. Frobes and Mairan.
" 15. Frobes and Mairan.
" 18. *Sweden.* Celsius. Frobes and Mairan.
" 19. *Berlin.* Kirch. Mairan.
" 21. Frobes and Mairan.
" 22. Frobes and Mairan.
April 2. Frobes and Mairan.
May 1. *Berlin.* Kirch. Mairan.
" 11. Frobes and Mairan.
June 8. Frobes and Mairan.
Aug. 28. *Sweden.* Celsius. Frobes and Mairan.
Sept. 16. *Lynn.* Folkes.[1]
" 16. *Sweden.* Celsius. Frobes.
" 16. Mairan, Maraldi, Pilgram, and Short.
" 17. *Lynn.* Folkes. Mairan[2] and Phil. Trans.
" 22. *Lynn.* Folkes.
" 22. Mairan, Pilgram, and Phil. Trans.
" 24. *Lynn.* Folkes.
" 24. Mairan, Pilgram, and Phil. Trans.
Oct. 11. *Sweden.* Celsius. Frobes and Mairan.
" 22. *Lynn.* Folkes.
" 22. Mairan, Pilgram, and Phil. Trans.
" 23. *Paris.* De la Hire.[3]
" 27. *Sweden.* Celsius. Frobes and Mairan.
Nov. 2. Frobes and Mairan.
" 23. Mairan[4] and Pilgram.
Dec. 16. Phil. Trans. Mairan.
" 17. Frobes and Mairan.
" 18. *Sweden.* Celsius. Frobes and Mairan.
" 20. Phil. Trans. Mairan.
" 30. *Sweden.* Celsius. Frobes and Mairan.
" 30. Pilgram and Phil. Trans.
" 31. Frobes and Mairan.

1719.

Feb. 11. *Berlin.* Kirch. Mairan.
" 22. Mairan and Pilgram.[5]
" 23. Frobes and Mairan.
Mar. 5. Frobes and Mairan.
" 6. Frobes and Mairan.
" 23. *Lynn.* Folkes. Pilgram.

[1] Phil. Trans., XXXII. 300.
[2] Traité, &c., p. 206.
[3] Mémoires de l'Acad., 1718, p. 286.
[4] Mémoires de l'Acad. [5] Ibid.

Mar. 23. Mairan and Phil. Trans.
" 25. Mairan and Pilgram.[1]
" 30. *Paris.* Maraldi.[2]
" 30. Frobes, Mairan, and Phil. Trans.[3]
April 7. *Lynn.* Folkes. Pilgram and Phil. Trans.[4]
" 9. Frobes and Mairan.
" 10. Frobes and Mairan.
" 18. Frobes and Mairan.[5]
Sept. 22. Mairan and Short.
" 24. Mairan and Short.
" 25. Frobes and Mairan.
Oct. 16. *Berlin.* Kirch. Celsius and Mairan.
" 22. Short and Mairan.
" 23. *Halle.* Thibes. Boué.[6]
" 27. Frobes and Mairan.
" 30. Frobes and Mairan.
Nov. *x.* Frobes and Mairan.
" 3. *Reichstatt.* Rost. Boué.
" 6. *Lynn.* Folkes. *Devonshire.* Maunder.[7]
" 6. Pilgram and Short.
" 13. *Berlin.* Kirch. Celsius and Mairan.
" 14. Frobes and Mairan.
" 17. Frobes and Mairan.
" 20. *Lynn.* Folkes.
" 20. Celsius, Pilgram, and Phil. Trans.
" 21. *Dublin, Ireland.*[8] ——— Short. Mairan.
" 21. *New England.*[9] ———
" 21. *London.* Halley.[10] Pilgram.
" 22. Frobes and Mairan.
" 24. Frobes and Mairan.
Dec. 1. Frobes and Mairan.
" 5. *Dublin.* Mairan. Pilgram and Phil. Trans.
" 7. ——— Short. Mairan.
" 22. *Streatham.* Hearne.[11]
" 22. *New England.*[12] *Salem.* Felt.
" 23. *Streatham.* Hearne.
" 30. ——— Short. Mairan.

1720.

Jan. 1. *Sweden.* Celsius. Frobes and Mairan.
" 2. *Berlin.* Kirch. Mairan.

[1] Mémoires de l'Acad.
[2] Boué refers to Montauban, with a query, for March 29.
[3] Mémoires de l'Acad., 1719. [4] Ibid.
[5] Boué quotes Bertholon for April 17.
[6] Breslau Coll., 1719, II. 581.
[7] Phil. Trans., XXX. 1101. [8] Ibid., p. 1104.
[9] Mass. Coll., II. 17.
[10] Phil. Trans., XXX. 1099. [11] Ibid., p. 1107.
[12] Mass. Coll., II. 17–20.

Jan. 23? Phil. Trans., Mairan, and Short.[1]
" 28. Mairan, Pilgram, and Phil. Trans.
Feb. 6. Frobes, Mairan, Maraldi, and Pilgram.
" 10. Frobes, Mairan, Maraldi, and Pilgram.
" 11. *Lynn.* Folkes. Celsius, Frobes, and Mairan.
" 11. Maraldi, Pilgram, and Phil. Trans.
" 15. *Berlin.* Kirch. Celsius and Mairan.
" 22. Frobes and Mairan.
" 26. Frobes and Mairan.
Mar. 9. Frobes, Mairan, Maraldi, and Pilgram.
" 23. ——— Short. Mairan.
April 7. ——— Short.[2] Mairan.
Aug. 15. *Paris.* Mairan and Pilgram.
Sept. 10. *Paris and London.*
" 10. Frobes, Mairan, and Pilgram.
" 28. *Lynn.* Folkes. *Paris and London.*
" 28. Mairan, Pilgram, and Phil. Trans.
Oct. 27. Celsius and Mairan.[3]
Nov. 6. ——— Short. Mairan.
" 7. *Berlin.* Kirch. Frobes and Mairan.
" 20. ——— Short. Mairan.
" 25. *Berlin.* Kirch. Mairan.
" 28. *Salem.* Felt.[4]
" 29. *Paris.* Maraldi.[5]
" 29. Celsius, Frobes, Mairan, and Pilgram.
Dec. 2. Frobes and Mairan.
" 3. Phil. Trans. Mairan.
" 5. *Salem.* Felt. Phil. Trans.
" 6. Celsius, Frobes, and Mairan.
" 10. Frobes and Mairan.
" 28. Frobes and Mairan.
" 28. Maraldi and Pilgram.

1721.

Jan. 17. *Lynn.* Folkes. Mairan.
" 17. Pilgram and Phil. Trans.
" 22. Mairan, Pilgram, and Phil. Trans.
" 23. *Berlin.* Kirch. *Lynn.* Folkes.
" 23. Mairan and Phil. Trans.
Feb. 11. ——— Short. Mairan.
" 17. *Berlin.* Kirch. *Dublin.*[6] ———
" 17. ——— Liebknecht.[7]
" 17. Celsius, Frobes, Mairan, and Pilgram.
Feb. 22. ——— Pilgram.
" 23. Frobes and Mairan.
" 28. Frobes and Mairan.
Mar. 1. *Berlin.* Kirch. Celsius.
" 1. Liebknecht,[1] Mairan, and Pilgram.
" 12. Frobes and Mairan.
" 29. Frobes and Mairan.
Sept. 12. Celsius and Mairan.
" 16. Liebknecht[2] and Pilgram.
" 22. Celsius, Mairan, and Phil. Trans.
" 28. *Lynn.* Folkes. Short.
Oct. 3. Frobes and Mairan.
" 21. Celsius, Mairan, and Pilgram.
" 23. Frobes and Mairan.
" 24. Frobes and Mairan.
" 31. Frobes and Mairan.
Nov. 1. Frobes and Mairan.
" 2. Mairan and Phil. Trans.
" 29. *Paris.* Maraldi, Boué.

1722.

Jan. 7. Mairan and Pilgram.
" 8. Mairan and Pilgram.
" 9. Mairan and Pilgram.
" 12. Mairan and Pilgram.
" 17. Mairan and Short.
" 22. Frobes and Mairan.
" 23. Frobes, Mairan, and Short.
" 25. Frobes and Mairan.
Feb. 12. Celsius and Mairan.
" 13. Celsius and Mairan.
" 16. Celsius and Mairan.
" 20. Mairan and Pilgram.
" 23. Frobes and Mairan.
" 24. Frobes and Mairan.
" 27. Frobes and Mairan.
Mar. 1? Celsius and Mairan.[3]
" 17. Frobes and Mairan.
" 18. Frobes and Mairan.
" 25? Mairan.
" 27. Frobes and Mairan.
April 5. Frobes and Mairan.
May 23. Frobes and Mairan.
June 4. Frobes and Mairan.

[1] See Mairan, p. 525.
[2] Boué refers to Auroras on March 11 and April 11.
[3] Boué quotes Celsius for October 22.
[4] Hist. of Salem, II. 137.
[5] Mémoires de l'Acad., 1721, p. 2.
[6] Phil. Trans., XXXI. 180.
[7] Acta Erud., 1721, p. 157.

[1] Acta Erud., 1721, p. 157.
[2] Pharus, p. 66.
[3] Mairan gives the aurora of March 1 in Celsius's catalogue, but not in his own general catalogue, p. 494; he gives the aurora of March 25 in his general catalogue, but in none of the special catalogues.

Sept. 5. Mairan and Pilgram.
" 6. Celsius, Mairan, and Pilgram.
" 7. Celsius and Mairan.
" 10. Mairan and Pilgram.
" 12. ——— Mairan.
" 16. *Lynn.* Folkes.[1] Frobes, Mairan, and Pilgram.
" 17. *Berlin.* Kirch. Frobes and Mairan.
" 18. *Berlin.* Kirch. Frobes and Mairan.
" 22. Mairan and Short.
Oct. 3. *Berlin.* Kirch.
" 3. Celsius, Mairan, and Pilgram.
" 7. *Berlin.* Kirch, Mairan.
" 8. Celsius and Mairan.
" 9. Celsius and Mairan.
" 10. Celsius and Mairan.
" 14. *Lynn.* Folkes. Celsius.
" 14. Frobes, Mairan, and Pilgram.
" 15. Celsius, Mairan, Pilgram, and Phil. Trans.
" 19. Frobes and Mairan.
" 20. Frobes and Mairan.
" 21. Frobes and Mairan.
" 25. Frobes and Mairan.
" 26. Frobes and Mairan.
Nov. 3. Celsius and Mairan.
" 9. Mairan and Pilgram.
" 10. *Upsal.* Burman.[2]
" 10. Celsius, Frobes, and Mairan.
" 14. Frobes and Mairan.
" 22. Frobes and Mairan.
" 23. Frobes and Mairan.
" 24. Frobes and Mairan.
Dec. 3. Frobes and Mairan.
" 4. Celsius and Mairan.
" 12. Frobes and Mairan.
" 15. Frobes and Mairan.
" 31. *Italy.*[3] Manfredi. Frobes and Mairan.

1723.

Jan. 1. *Lynn.* Folkes. Celsius and Mairan.
" 3. *Paris.* Mairan. Celsius and Pilgram.
" 6. Frobes and Mairan.
" 12. Frobes and Mairan.
" 14. Frobes and Mairan.

[1] Phil. Trans., XXXII.

[2] Acta Lit. Sueciæ, I. 393.

[3] Mairan says (p. 208) it was the first observed in that country. Comm. Acad. Bonon., I. p. 297. This corrects the statement of Musschenbroek, quoted in my former Memoir. Mem. Amer. Acad., IX. 103. The aurora of March 17, 1727, was the first observed by an *astronomer*.

Jan. 24. *Upsal.* Burman.
" 24. Celsius, Frobes, and Mairan.
Feb. 4. *Upsal.* Burman. Celsius.
" 4. Frobes, Mairan, and Pilgram.
Mar. 2. *Lynn.* Rastrick.[1]
" 2. Mairan, Pilgram, and Short.
" 3. *Berlin.* Kirch. *Upsal.* Burman.
" 3. Celsius, Frobes, and Mairan.
" 4. *Upsal.* Burman.
" 4. Celsius, Frobes, and Mairan.
" 7. *Upsal.* Burman.
" 7. Celsius, Frobes, and Mairan.
" 10. Frobes and Mairan.
" 21. Frobes and Mairan.
" 24. *Upsal.* Burman.
" 24. Celsius, Frobes, and Mairan.
" 25. Mairan and Pilgram.
" 26. *Lynn.* Rastrick. Mairan and Short.
April 2. *Upsal.* Burman.
" 2. Celsius, Frobes, and Mairan.
" 4. *Upsal.* Burman.
" 4. Celsius, Frobes, and Mairan.
" 9. *Upsal.* Burman.
" 9. Celsius, Frobes, and Mairan.
" 15. *Upsal.* Burman.
" 24. *Berlin.* Kirch. Mairan and Pilgram.
Aug. 31. *Lynn.* Rastrick.
" 31. Short, Mairan, and Pilgram.
Sept. 1. Celsius and Mairan.
" 7. Frobes and Mairan.
" 12. Frobes and Mairan.
" 17. Celsius and Mairan.
" 28. Frobes and Mairan.
Oct. 31. *Lynn.* Rastrick.
" 31. *Upsal.* Burman. *Sweden.* Celsius.
" 31. Frobes, Mairan, Pilgram, and Short.
Nov. 1. *Upsal.* Burman.
" 1. Celsius, Frobes, and Mairan.
" 2. Celsius and Mairan.
" 5. ——— Pilgram.
" 12. Frobes and Mairan.
Dec. 2. Mairan and Pilgram.
" 18. Frobes and Mairan.

1724.

Jan. 17. Celsius, Frobes, and Mairan.
" 22–3. *Upsal.* Burman.[2]
" 29. Celsius, Frobes, and Mairan.

[1] Phil. Trans., XXXIV. 255.

[2] Acta Lit. Sueciæ, II. 13.

Jan. 30. Frobes and Mairan.
Feb. 4. Frobes and Mairan.
" 11. *Sweden.* Celsius. Frobes and Mairan.
Mar. 24. Celsius, Frobes, and Mairan.
" 25. *Upsal.* Burman. Frobes and Mairan.
" *x.* Mairan and Pilgram.
April 14. *Upsal.* Burman. Celsius, Frobes, and Mairan.
May 4. Celsius, Frobes, and Mairan.
" 22. Celsius, Frobes, and Mairan.
Aug. 4. Frobes and Mairan.
" 12. Frobes and Mairan.
" 17. Celsius, Frobes, and Mairan.
" 24. Frobes and Mairan.
" 31. Frobes and Mairan.
Sept. 9. Frobes and Mairan.
" 22. Frobes and Mairan.
" 23. Frobes and Mairan.
Oct. 16. *Upsal.* Burman. Frobes and Mairan.
" *x.* Mairan and Pilgram.
Nov. 8. *Upsal.* Burman. Celsius, Frobes, and Mairan.
" 9. *Sweden.* Celsius. Mairan.
" 16. *Upsal.* Burman. Frobes and Mairan.
Dec. 6. *Upsal.* Burman. Frobes and Mairan.
" 7. *Upsal.* Burman. Frobes and Mairan.
" 8. *Upsal.* Burman. Frobes and Mairan.
" 25. Frobes and Mairan.

1725.

Jan. 7. *Sweden.* Celsius, Frobes, and Mairan.
" 8. Celsius, Frobes, and Mairan.
" 9. Celsius, Frobes, Mairan, and Pilgram.
" 12. Celsius, Frobes, and Mairan.
" 13. Celsius, Frobes, and Mairan.
Feb. 6. Frobes and Mairan.
" 9. *Sweden.* Celsius. Frobes and Mairan.
" 11. Frobes and Mairan.
" 12. *Berlin.* Kirch. Mairan.
" 15. *Upsal.* Burman.[1] Frobes and Mairan.
Mar. 16. *Berlin.* Kirch. Mairan.
April 2. *Upsal.* Burman. Frobes and Mairan.
" 17. *Upsal.* Burman. Frobes and Mairan.
" 24. *Berlin.* Kirch. Mairan.
May 2. Celsius and Mairan.
Sept. 6. *Upsal.* Burman.[2]
" 9. *Upsal.* Burman.
" 11. *Upsal.* Burman.
" 16. Mairan and Short.
" 19. *Upsal.* Burman. Frobes and Mairan.

[1] Acta Lit. Sueciæ, II. 141. [2] Ibid., III.

Oct. 5. *Berlin.* Kirch. *Ireland.* Dobbs.[1]
" 5. *Sweden.* Celsius. Frobes.
" 5. *Upsal.* Burman. Mairan and Pilgram.
" 6. *Ireland.* Dobbs.
" 6. Celsius, Mairan, and Pilgram.
" 7. *Ireland.* Dobbs. *Berlin.* Kirch.
" 7. *Lynn.* Rastrick. *Upsal.* Burman. Celsius.
" 7. Frobes, Mairan, and Pilgram.
" 8. Celsius, Frobes, and Mairan.
" 9. Celsius, Frobes, and Mairan.
" 14. Mairan and Short.
" 15. Mairan and Short.
Nov. 26. *Upsal.* Burman. Celsius, Frobes, and Mairan.
Dec. 5. Celsius, Frobes, and Mairan.
" 6. Celsius, Frobes, and Mairan.
" 7. Celsius, Frobes, and Mairan.
" 8. Celsius, Frobes, and Mairan.
" 21. *Sweden.* Celsius. Frobes and Mairan.

1726.

Jan. 3. Mairan and Short.
" 19. *Sweden.* Celsius. Frobes and Mairan.
Feb. 7. Celsius, Frobes, and Mairan.
Mar. 2. *Upsal.* Burman.[2] Frobes and Mairan.
" 6. Mairan and Phil. Trans.
" 10. Frobes, Mairan, and Phil. Trans.
" 10. *Upsal.* Burman.
" 14. *Upsal.* Burman. Frobes, Mairan, Phil. Trans.
" 24. Celsius, Frobes, and Mairan.
" 25. Mairan and Phil. Trans.
" 26. Frobes, Mairan, and Phil. Trans.
" 26. *Upsal.* Burman.
" 27. *St. Petersburg.* Kraft.[3] The Delisles.
" 27. *Upsal.* Burman. Celsius and Frobes.
" 27. Mairan and Phil. Trans.
" 28. Mairan and Phil. Trans.
April 2. Phil. Trans. and Mairan.
" 23. Phil. Trans. and Mairan.
Sept. 5. Celsius, Frobes, and Mairan.
" 26. *Near Paris.* Mairan. Pilgram.
" 28. Celsius, Frobes, and Mairan.
Oct. 10. ——— Short.
" 14. *Lynn.* Rastrick.[4]
" 14. *Upsal.* Burman. Frobes, Mairan, and Short.
" 15. *Lynn.* Rastrick. Short.
" 17. Frobes, Mairan, and Phil. Trans.

[1] Phil. Trans., XXXIV. 128.
[2] Acta Lit. Sueciæ, II. 257.
[3] Comm. Petrop., IX.
[4] Phil. Trans., XXXIV. 255.

Oct. 17. *Upsal.* Burman.
" 19. *St. Petersburg.* Kraft. The Delisles, Mairan.
" 19. *Berlin.* Kirch. *Lynn.* Rastrick.
" 19. *Petworth.* Langwith.[1] ——— Mairan.[2]
" 19. *Upsal.* Burman. Celsius and Frobes.
" 19. Short and Thompson.
" 20. Frobes and Mairan.
" 21. Frobes, Mairan, and Phil. Trans.
" 23. Mairan and Phil. Trans.
" 24. Mairan and Phil. Trans.
" 26. Celsius, Mairan, and Phil. Trans.
Nov. 2. Mairan and Phil. Trans.
" 4. ——— Mairan. Phil. Trans.
" 4. *Sweden.* Celsius. Frobes and Pilgram.
" 6. *Lynn.* Rastrick.
" 6. Mairan, Pilgram, and Short.
" 13. Mairan and Phil. Trans.
" 18. ——— Beccari.[3]
" 18. Frobes, Mairan, and Phil. Trans.
" 18. *Upsal.* Burman.
" 19. ——— Pilgram. *West.* Godin.
" 19. Mairan and Phil. Trans.
Dec. 1. Frobes and Mairan.
" 7. Mairan and Short.
" 10. *Sweden.* Celsius. Frobes and Mairan.
" 16. *Montpellier.* Plantade.[4]
" 16. Frobes, Mairan, and Phil. Trans.
" 16. *Upsal.* Burman.
" 17. Frobes, Mairan, and Phil. Trans.
" 17. *Upsal.* Burman.
" 18. Celsius, Mairan, and Phil. Trans.
" 19. Mairan and Phil. Trans.
" 20. Mairan and Phil. Trans.
" 21. *Sweden.* Celsius. Frobes.
" 21. Mairan and Phil. Trans.
" 22. *Sweden.* Celsius. Frobes and Mairan.
" 23. Mairan and Phil. Trans.
" 25. Mairan and Phil. Trans.
" 26. Mairan and Phil. Trans.
" 27. Mairan and Phil. Trans.

1727.

Jan. 1. *Sweden.* Celsius. Frobes and Mairan.
" 2. Mairan and Phil. Trans.

[1] Phil. Trans., 1726, p. 132.
[2] Mr. Herrick probably means this aurora when he refers to the aurora of August 19, 1726, as having excited Mairan to his great undertaking. Amer. Journ., XXIX. 388.
[3] Comm. Bonon., I. 288.
[4] Encyc. Method., I. 370.

Jan. 13. Celsius, Frobes, and Mairan.
" 15. ——— Langwith.[1]
" 15. Frobes, Mairan, and Pilgram.
" 16. ——— Langwith.
" 16. Celsius, Frobes, Mairan, and Pilgram.
" 17. Celsius, Frobes, Mairan, and Pilgram.
" 27. *Sweden.* Celsius. Frobes and Mairan.
Feb. 13. *Italy.* Beccari. *Utrecht.* Musschenbroek.
" 18. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 20. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 21. *St. Petersburg.* Kraft. The Delisles.
" 21. *Sweden.* Celsius, Frobes, and Mairan.
" 22. *St. Petersburg.* Kraft. The Delisles.
" 22. Celsius, Frobes, and Mairan.
" 27. *Sweden.* Celsius, Frobes, and Mairan.
Mar. 9. *Sweden.* Celsius, Frobes, and Mairan.
" 11. *Italy.* Beccari.
" 11. *Sweden.* Celsius. Frobes and Mairan.
" 12. Celsius, Frobes, and Mairan.
" 13. *St. Petersburg.* Kraft. *Berlin.* Kirch.
" 13. *Petworth.* Langwith.
" 13. Celsius, Frobes, Mairan, and Pilgram.
" 13. *Upsal.* Burman.[2]
" 14. *Bologna.* Zanotti. *Lynn.* Rastrick.
" 14. *Berlin.* Kirch. *Petworth.* Langwith.
" 14. Celsius, Frobes, Mairan, and Short.
" 14. *Upsal.* Burman.
" 15. Frobes and Mairan.
" 16. *Bologna.* Zanotti. *Lynn.* Rastrick. Short.
" 16. Celsius, Frobes, Mairan, and Pilgram.
" 16. *Upsal.* Burman.
" 17. *Bologna.* Zanotti. Mairan.
" 17. Celsius, Frobes, Mairan, and Pilgram.
" 18. *Bologna.* Zanotti and Beccari. Mairan.
" 19. *Bologna.* Zanotti and Beccari. Mairan.
" 19. Frobes and Mairan.
" 20. *Bologna.* Zanotti. Mairan.
" 24. *St. Petersburg.* Kraft. The Delisles.
" 24. ——— Mairan. Celsius and Frobes.
" 24. *Upsal.* Burman.
" 28. Celsius, Frobes, and Mairan.
" 29. *Italy.* Beccari. Mairan.
April 8. Celsius, Frobes, and Mairan.
" 10. *Upsal.* Burman. Celsius, Frobes, and Mairan.
" 14. Frobes and Mairan.
" 18. *Berlin.* Kirch.

[1] Phil. Trans., XXXV. 304.
[2] Acta Lit. Sueciæ, II. 493.

April 18. Celsius, Frobes, and Mairan.
May 13. *Bologna.* Zanotti. Mairan.
Aug. 1. Celsius, Frobes, and Mairan.
" 6. Celsius, Frobes, and Mairan.
" 22. *Upsal.* Burman. Celsius, Frobes, and Mairan.
" 24. Celsius, Frobes, and Mairan.
" 31. Celsius, Frobes, and Mairan.
Sept. 3. *Cola* (*Russia*). Croyere.[1]
" 7. Celsius, Frobes, and Mairan.
" 14. Celsius, Frobes, and Mairan.
" 15. *Cola.* Croyere.
" 18. *Cola.* Croyere. *St. Petersburg.* Kraft.
" 18. The Delisles, Celsius, Frobes, and Mairan.
" 22. *St. Petersburg.* Kraft. The Delisles.
" 22. Frobes and Mairan.
" 23. Celsius, Frobes, and Mairan.
" 29. *Cola.* Croyere.
" 30. Celsius, Frobes, and Mairan.
Oct. 2. Celsius, Frobes, and Mairan.
" 4. *Cola.* Croyere.
" 5. Celsius, Frobes, and Mairan.
" 6. Celsius, Frobes, and Mairan.
" 9. *Cola.* Croyere.
" 13. Frobes and Mairan.
" 14. *St. Petersburg.* Kraft. The Delisles.
" 14. *Upsal.* Burman. Celsius, Frobes, and Mairan.
" 15. *Cola.* Croyere. *St. Petersburg.* Kraft.
" 15. The Delisles, Celsius, Frobes, and Mairan.
" 17. *Italy.* Beccari. Frobes and Mairan.
" 18. *Italy.* Beccari. Mairan.
" 19. *Berlin.* Kirch. *Cola.* Croyere.
" 19. Celsius, Frobes, Mairan, and Pilgram.
" 20. *Upsal.* Burman. Celsius, Frobes, and Mairan.
" 21. Celsius, Frobes, Mairan, and Pilgram.
" 21. *Upsal.* Burman.
" 27. *Cola.* Croyere.
" 29. *Cola.* Croyere.
Nov. 1. *Cola.* Croyere.
" 3. *Cola.* Croyere. Celsius and Mairan.
" 4. Frobes and Mairan.
" 6. Frobes and Mairan.
" 7. *Cola.* Croyere.
" 13. *Cola.* Croyere.
" 16. *Cola.* Croyere.
" 19. *Cola.* Croyere.
" 20. *Upsal.* Burman. Celsius, Frobes, and Mairan.
" 22. *Cola.* Croyere.
" 23. Celsius and Mairan.

[1] Delisle, Mem. pour servir à l'Histoire de l'Astronomie.

Nov. 24. Celsius and Mairan.
" 25. *Between Cola and Kilduin.* Croyere.
" 25. Celsius and Mairan.
" 27. *Between Cola and Kilduin.* Croyere.
" 29. *Between Cola and Kilduin.* Croyere.
Dec. 2. *Kilduin.* Croyere.
" 6. *Kilduin.* Croyere.
" 6. Celsius, Frobes, and Mairan.
" 9. *Kilduin.* Croyere.
" 11. *Between Kilduin and Cola.* Croyere.
" 11. Celsius, Frobes, and Mairan.
" 15. *Between Kilduin and Cola.* Croyere.
" 16. Celsius, Frobes, and Mairan.
" 17. *Sweden.* Celsius. Frobes and Mairan.
" 19. *Sweden.* Celsius. Frobes and Mairan.
" 20. *St. Petersburg.* Kraft. The Delisles, Mairan.
" 23. *Cola.* Croyere.
" 26. *Cola.* Croyere.
" 31. *Cola.* Croyere.

1728.

Jan. 1. *Sweden.* Celsius, Frobes, and Mairan.
" 3. *Italy.* Beccari. Mairan.
" 12. *Salem.* Felt.[1]
" 20. Frobes and Mairan.
" 29. *St. Petersburg.* Kraft. The Delisles, Mairan.
" 30. *Sweden.* Celsius. Mairan.
Feb. 7. *Utrecht.* Musschenbroek.[2] Mairan, Pilgram.
" 8. *Sweden.* Celsius. Frobes and Mairan.
" 9. *Sweden.* Celsius. Frobes, Mairan, Pilgram.
" 10. *Sweden.* Celsius. Frobes and Mairan.
" 11. *Utrecht.* Musschenbroek.
" 11. *Sweden.* Celsius. Frobes, Mairan, Pilgram.
" 12. *St. Petersburg.* Kraft. The Delisles.
" 12. *Sweden.* Celsius. Frobes and Mairan.
" 13. *Utrecht.* Musschenbroek.
" 13. *St. Petersburg.* Kraft. The Delisles.
" 13. *Berlin.* Kirch. Pilgram.
" 13. *Sweden.* Celsius. Frobes and Mairan.
" 14. *Sweden.* Celsius. Frobes and Mairan.
" 26. Celsius, Frobes, and Mairan.
" 29. Celsius, Frobes, and Mairan.
Mar. 2. *St. Petersburg.* Kraft. The Delisles.
" 2. ——— Mairan and Pilgram.
" 3. *St. Petersburg.* Kraft. The Delisles, Mairan.
" 4. *St. Petersburg.* Kraft. The Delisles, Mairan.
" 8. *St. Petersburg.* Kraft. The Delisles, Mairan.

[1] Hist. of Salem, II.
[2] Tab. Met., 1728.

Mar. 8. *Plymouth, Eng.* Huxham.[1] Short.
" 9. *St. Petersburg.* Kraft. The Delisles, Mairan.
" 10. *St. Petersburg.* Kraft. The Delisles.
" 10. *Sweden.* Celsius. Frobes and Mairan.
" 14. *Sweden.* Celsius. Frobes and Mairan.
" 20. *Utrecht.* Musschenbroek. Mairan.
" 20. Celsius, Frobes, and Pilgram.
" 26. Frobes and Mairan.
" 27. *St. Petersburg.* Kraft. The Delisles.
" 27. Frobes and Mairan.
" 28. *Sweden.* Celsius, Frobes, and Mairan.
" 28. *Upsal.* Burman.[2]
" 29. Frobes and Mairan.
" 30. *Utrecht.* Musschenbroek.
" 30. Mairan and Pilgram.
" 31. *Bologna.* Zanotti. Mairan.
" 31. Mairan and Phil. Trans.
April 2. *St. Petersburg.* Kraft. The Delisles. Short.
" 2. *Berlin.* Kirch. *Utrecht.* Musschenbroek.
" 2. *Plymouth.* Huxham. *Italy.* Zanotti.
" 2. Celsius, Frobes, Mairan, and Pilgram.
" 3. *St. Petersburg.* Kraft. The Delisles.
" 3. *Plymouth.* Huxham. Short.
" 3. *Sweden.* Celsius. Frobes and Mairan.
" 4. Frobes, Mairan, and Phil. Trans.
" 7. *Sweden.* Celsius. Frobes and Mairan.
" 9. *Utrecht.* Musschenbroek.
" 9. *Italy.* Beccari. Mairan and Pilgram.
" 12. *Utrecht.* Musschenbroek.
" 12. Mairan and Pilgram.
" 15. Mairan and Phil. Trans.
May 1. *St. Petersburg.* Kraft. The Delisles, Mairan.
" 3. *Berlin.* Kirch. Mairan.
" 30. *Italy.* Beccari. Mairan.
June 7. Frobes and Mairan.
" 25. *Berlin.* Kirch. Celsius and Frobes.
" 25. ——— Mairan. Pilgram.
July 1. Mairan and Phil. Trans.
" 3. ——— Mairan. Pilgram.
" 13. *Italy.* Beccari. *Berlin.* Kirch.
" 13. *Plymouth.* Huxham. Phil. Trans.
" 13. ——— Mairan. Pilgram.
" 15. *Plymouth.* Huxham.
" 16? ——— Pilgram.
Aug. 2. *Plymouth.* Huxham. ——— Mairan.
" 2. Phil. Trans. and Pilgram.
" 25. *St. Petersburg.* Kraft. The Delisles, Mairan.

[1] Amer. Journ., XXXIII. 298.
[2] Acta Lit. Sueciæ, II. 513.

Aug. 27. *Kilduin.* Croyere.
" 28. *Plymouth.* Huxham.
" 28. *Sweden.* Celsius. Frobes and Mairan.
" 29. *Plymouth.* Huxham. Short and Mairan.
" 29. *Upsal.* Burman. Celsius, Frobes, and Pilgram.
" 30. *Berlin.* Kirch. Mairan.
" 30. *Sweden.* Celsius. Frobes.
" 31. *Utrecht.* Musschenbroek.
" 31. *Upsal.* Burman. Celsius.
" 31. Frobes, Mairan, and Pilgram.
Sept. 1. *Kilduin.* Croyere.
" 5. *Upsal.* Burman. Frobes and Mairan.
" 6. Mairan and Phil. Trans.
" 7. *Sweden.* Celsius. Frobes and Mairan.
" 13. *Upsal.* Burman. Frobes and Mairan.
" 15. ——— Pilgram.
" 21. *Cola.* Croyere.
" 26. *St. Petersburg.* Kraft. The Delisles.
" 26. *Italy.* Beccari. *Berlin.* Kirch. Mairan.
" 27. *St. Petersburg.* Maier.[1] Mairan.
" 27. Frobes and Pilgram.
" 28. *St. Petersburg.* Kraft. The Delisles.
" 29. *Sweden.* Celsius. Frobes.
" 29. Mairan and Phil. Trans.
" 30. *Utrecht.* Musschenbroek.
" 30. *Sweden.* Celsius. Frobes.
" 30. Mairan, Pilgram, and Phil. Trans.
Oct. 2. *Italy.* Beccari. *Berlin.* Kirch. Mairan.
" 2. *Zurich.* Scheuchzer.[2] Mairan.
" 2. *Sweden.* Celsius. Frobes.
" 2. Phil. Trans. and Pilgram.
" 3. *Cola.* Croyere.
" 4. Frobes and Mairan.
" 5. Mairan and Phil. Trans.
" 6. *Cola.* Croyere.
" 7. *St. Petersburg.* Kraft. The Delisles.
" 7. *Utrecht.* Musschenbroek.
" 7. ——— Mairan. Frobes and Pilgram.
" 8. *St. Petersburg.* Kraft. The Delisles.
" 11. *St. Petersburg.* Kraft. The Delisles.
" 11. *Sweden.* Celsius. Frobes and Mairan.
" 12. *Plymouth.* Huxham.
" 12. *Utrecht.* Musschenbroek.
" 12. ——— Mairan. *Upsal.* Burman. Celsius.
" 12. Frobes, Short, and Pilgram.
" 13. *Salem.* Felt.
" 14. Celsius and Mairan.

[1] Comm. Petrop., IV. 121.
[2] Acta Acad. Nat. Curios., II. 51, Appendix.

Oct. 17. Celsius and Mairan.
" 18. *Cola.* Croyere. Mairan and Phil. Trans.
" 19. *Cola.* Croyere. Mairan and Phil. Trans.
" 24. *Redbridge.* Derham.[1] Mairan.
" 24. *Sweden.* Celsius. Frobes and Pilgram.
" 25. *St. Petersburg.* Kraft. The Delisles.
" 25. *Plymouth.* Huxham. Short.
" 25. ——— Mairan. Pilgram.
" 26. *Plymouth.* Huxham.
" 26. *Cola.* Croyere. Phil. Trans. and Mairan.
" 27. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 29. *Utrecht.* Musschenbroek.
" 29. *Cola.* Croyere. Mairan.
" 29. Pilgram and Phil. Trans.
" 30. *St. Petersburg.* Kraft. The Delisles.
" 30. *Italy.* Beccari.
" 30. *Utrecht.* Musschenbroek.
" 30. Mairan, Pilgram, and Phil. Trans.
" 31. *Cola.* Croyere.
Nov. 2. *St. Petersburg.* Kraft. The Delisles.
" 2. *Plymouth.* Huxham. *Utrecht.* Musschenbroek.
" 2. Celsius, Frobes, and Mairan.
" 2. Pilgram and Phil. Trans.
" 3. Mairan and Phil. Trans.
" 4. ——— Mairan. Pilgram.
" 5. *Upsal.* Burman. Celsius.
" 5. Frobes and Mairan.
" 7. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 8. Celsius, Frobes, and Mairan.
" 12. *Berlin.* Kirch. Mairan.
" 13. *Berlin.* Kirch. Mairan.
" 15. *Cola.* Croyere.
" 16. *Cola.* Croyere.
" 22. *Cola.* Croyere.
" 22. *Sweden.* Celsius. Frobes and Mairan.
" 23. *Utrecht.* Musschenbroek. ——— Mairan.
" 23. *Sweden.* Celsius.[2] Frobes.
" 23. Pilgram and Phil. Trans.
" 27. *Cola.* Croyere.
" 29. *Cola.* Croyere.
Dec. 2. *Italy.* Beccari. Mairan.
" 3. *St. Petersburg.* Kraft. The Delisles.
" 3. *Plymouth.* Huxham. Mairan and Short.
" 4. Frobes and Mairan.
" 7. *Cola.* Croyere.
" 10. *Cola.* Croyere.
Dec. 14. Frobes and Mairan.
" 15. *Cola.* Croyere.
" 27. *Cola.* Croyere.
" 31. *Sweden.* Celsius. Frobes and Mairan.

1729.

Jan. 14. *Sweden.* Celsius. Frobes and Mairan.
" 15. *Cola.* Croyere.
" 17. *Plymouth.* Huxham. Short.
" 17. Celsius, Frobes, and Mairan.
" 17. Pilgram and Phil. Trans.
" 18. Celsius and Mairan.
" 19. Between *Cola* and *Kilduin.* Croyere.
" 20. Frobes and Mairan.
" 24. Frobes and Mairan.
" 25. *Plymouth.* Huxham.
" 28. *Kilduin.* Croyere.
Feb. 2. *Sweden.* Celsius. Frobes and Mairan.
" 3. *Kilduin.* Croyere.
" 3. *Sweden.* Celsius. Frobes and Mairan.
" 7. Between *Kilduin* and *Cola.* Croyere.
" 11. Celsius and Mairan.
" 16. Celsius, Frobes, and Mairan.
" 17. *Cola.* Croyere. Frobes and Mairan.
" 23. *Cola.* Croyere.
" 25. *Sweden.* Celsius. Frobes and Mairan.
" 27. *Sweden.* Celsius. Frobes and Mairan.
" 28. *Sweden.* Celsius. Frobes and Mairan.
Mar. 2. Celsius, Frobes, and Mairan.
" 15. *Sweden.* Celsius. Frobes and Mairan.
" 16. *Sweden.* Celsius. Frobes and Mairan.
" 25. *Sweden.* Celsius. Frobes and Mairan.
" 27. Celsius, Frobes, and Mairan.
" 28. *Sweden.* Celsius. Frobes and Mairan.
" 30. *Sweden.* Celsius. Frobes and Mairan.
Apr. 6. *Sweden.* Celsius. Frobes and Mairan.
" 19. Frobes and Mairan.
" 22. *Plymouth.* Huxham. Mairan and Short.
" 24. *Sweden.* Celsius. Frobes and Mairan.
" 27. *Sweden.* Celsius. Frobes and Mairan.
" 28. *Sweden.* Celsius. Frobes and Mairan.
" 30. Frobes and Mairan.
May 1. Celsius, Frobes, and Mairan.
" 2. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 2. *Plymouth.* Huxham. *Sweden.* Celsius. Frobes.
" 17. *Plymouth.* Huxham. Mairan and Short.
" 22. Celsius, Frobes, and Mairan.
" 26. Celsius and Mairan.
" 27. Celsius and Mairan.
" 29. *St. Petersburg.* Kraft. Frobes.

[1] Phil. Trans., XXXVI. 137.

[2] Boué quotes Celsius for October 11 and 24; but Mairan does not mention these days.

May. 29. *Paris?* Mairan. Pilgram.
" 31. Frobes and Mairan.
June 15. *Paris?* Mairan. Frobes.
" 26. *Paris?* Mairan. Frobes.
July 7. *Berlin.* Kirch. Mairan.
Aug. 29. *St. Petersburg.* The Delisles. Mairan.
Sept. 10. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 12. *Sweden.* Celsius. Frobes and Mairan.
" 15. *Oustiong.* Croyere. *Sweden.* Celsius.[1]
" 15. *Paris.* Mairan. Frobes.
" 20. Frobes, Mairan, and Pilgram.
" 21. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 22. *St. Petersburg.* Kraft. The Delisles.
" 22. *Paris.* Mairan. Pilgram.
" 22. *Sweden.* Celsius. Frobes.
" 23. *Plymouth.* Huxham. Mairan and Short.
" 26. *Berlin.* Kirch. Mairan.
Oct. 2. *Sweden.* Celsius. Mairan.
" 11. Frobes and Mairan.
" 13. *Berlin.* Kirch. *Sweden.* Celsius.
" 13. *Paris.* Mairan. Frobes and Pilgram.
" 17. Frobes and Mairan.
" 21. Phil. Trans. Mairan.
" 22. *Berlin.* Kirch. Mairan.
" 22. *Sweden.* Celsius. Frobes.
" 24. *Sweden.* Celsius. Frobes and Mairan.
" 25. *Plymouth.* Huxham. Short.
" 25. *Paris.* Cassini. Mairan.[2]
Nov. 16. *St. Petersburg.* Kraft. The Delisles.
" 16. *Plymouth.* Huxham. Phil. Trans.
" 16. *Berlin.* Kirch. *Paris.* Mairan. Pilgram.
" 16. *Sweden.* Celsius. Frobes and Short.
" 17. *Sweden.* Celsius. Frobes and Mairan.
" 18. *Sweden.* Celsius. Frobes and Mairan.
" 19. *Sweden.* Celsius. Frobes and Mairan.
" 20. *Sweden.* Celsius. Frobes and Mairan.
" 30. *Sweden.* Celsius. Frobes and Mairan.
Dec. 17. *Berlin.* Kirch. Frobes and Mairan.
" 22. *Sweden.* Celsius. Frobes and Mairan.
" 27. *Sweden.* Celsius. Frobes and Mairan.
" 30. *Sweden.* Celsius. Frobes and Mairan.

1730.

Jan. 8. *Wittemberg.* Weidler. Mairan.
" 8. *Sweden.* Celsius. Frobes.
" 9. Mairan, Pilgram, and Phil.Trans.
" 16. *St. Petersburg.* Kraft. The Delisles.

[1] Acta Lit. Sueciæ, II. 611.
[2] Mém. de l'Acad. 1729, p. 321.

Jan. 16. *Sweden.* Celsius. Frobes and Mairan.
" 17. *Sweden.* Celsius. Frobes and Mairan.
" 26. *Sweden.* Celsius. Frobes and Mairan.
Feb. 3. *Sweden.* Celsius. Frobes and Mairan.
" 4. *Paris.* Mairan. Pilgram.
" 7. Frobes and Mairan.
" 9. *Sweden.* Celsius. Frobes and Mairan.
" 10. *Sweden.* Celsius. Frobes and Mairan.
" 15. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 15. *Geneva.* Cramer.[1] *Italy.* Beccari.
" 15. *Sweden.* Celsius.[2] Frobes and Pilgram.
" 16. *Berlin.* Kirch. Mairan.
" 16. *Betw'n Schleusselb'g & St. Petersb'g.* Croyere.
" 16. *Sweden.* Celsius. Frobes.
" 18. Frobes and Mairan.
" 27. *Sweden.* Celsius. Frobes and Mairan.
Mar. 2. *Berlin.* Kirch. Mairan.
" 2. *Sweden.* Celsius. Frobes.
" 3. *Italy.* Beccari. Mairan.
" 6. *St. Petersburg.* Kraft. The Delisles.
" 6. *Plymouth.* Huxham. *Abo.* Spöring.[3]
" 6. *Paris.* Bouillet.[4] *Italy.* Beccari.
" 6. Celsius, Frobes, Mairan, and Pilgram.
" 6. Short and Phil. Trans.
" 9. *Sweden.* Celsius. Frobes and Mairan.
" 10. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 11. *Bologna.* Zanotti.[5] Mairan.
" 13. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 13. *Bologna.* Zanotti and Beccari.
" 15. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 15. *Abo.* Spöring. Celsius and Frobes.
" 16. *St. Petersburg.* Kraft. The Delisles.
" 16. Mairan and Thompson.
" 17. Frobes and Mairan.
" 18. *St. Petersburg.* Kraft. The Delisles.
" 18. *Bologna.* Zanotti. Frobes and Mairan.
" 20. *Plymouth.* Huxham. Mairan and Short.
" 21. *Bologna.* Zanotti. Mairan.
" 22. *Sweden.* Celsius. Frobes.
" 22. *Abo.* Spöring. Mairan.
" 28. Boué and Mairan.[6]
Apr. *x.* Phil. Trans. Mairan.
" 7. *St. Petersburg.* Kraft. The Delisles. Mairan.

[1] Phil. Trans. XXXVI. 279.
[2] Acta Lit. Sueciæ, III. A. 106.
[3] Acta Lit. Sueciæ, III. A. 109.
[4] Mém. de l'Acad. 1730.
[5] Comm. Bonon. II. Pt. III. 489.
[6] Not in any special catalogue.

Apr. 9. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 12. *Plymouth.* Huxham. *Berlin.* Kirch.
" 12. *Paris.* Mairan. Frobes, Pilgram, and Short.
" 13. Frobes and Mairan.
" 14. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 14. *Abo.* Spöring. Celsius and Frobes.
" 15. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 15. *Italy.* Beccari. *Paris.* Mairan. Pilgram.
" 19. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 20. Frobes and Mairan.
" 22. *St. Petersburg.* Kraft. The Delisles. Mairan.
May 2. *Abo.* Spöring. Celsius, Frobes, and Mairan.
" 5. Celsius, Frobes, and Mairan.
" 9. *Sweden.* Celsius. Frobes and Mairan.
" 29. *Berlin.* Kirch. Mairan.
" 29. *St. Petersburg.* Kraft. The Delisles.
June 21. *Paris.* Mairan. Frobes and Pilgram.
" 21. *Bologna.* Zanotti and Beccari.
July 5. *Wittemberg.* Weidler. Frobes and Mairan.
" 6. Frobes and Mairan.
" 17. Frobes and Mairan.
" 19. Frobes and Mairan.
" 31. *Sweden.* Celsius. Frobes and Mairan.
Aug. 15. *Abo.* Spöring. Celsius, Frobes, and Mairan.
" 19. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 23. *St. Petersburg.* Kraft. The Delisles.
" 23. *Sweden.* Celsius. Frobes and Mairan.
" 24. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 24. *Abo.* Spöring. Celsius and Frobes.
" 29. *Sweden.* Celsius. Frobes and Mairan.
" 29. *Abo.* Spöring.
" 30. *Sweden.* Celsius. Frobes and Mairan.
Sept. 2. *Abo.* Spöring. Celsius, Frobes, and Mairan.
" 3. *Sweden.* Celsius. Frobes and Mairan.
" 4. *Sweden.* Celsius. Frobes and Mairan.
" 4. *Abo.* Spöring.
" 5. *Sweden.* Celsius. Frobes and Mairan.
" 6. *St. Petersburg,* Kraft. The Delisles. Mairan.
" 6. *Sweden.* Celsius. Frobes and Thompson.
" 7. *Sweden.* Celsius. Frobes and Mairan.
" 8. *St. Petersburg.* Kraft. The Delisles.
" 8. *Plymouth.* Huxham. Short.
" 8. *Sweden.* Celsius. Frobes and Mairan.
" 9. *Sweden.* Celsius. Frobes and Mairan.
" 10. *Sweden.* Celsius. Frobes.
" 10. Mairan and Phil. Trans.
" 11. *Italy.* Beccari. Mairan.
" 11. *Sweden.* Celsius. Frobes.
" 13. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 17. *St. Petersburg.* Kraft. The Delisles.
Sept. 17. *Sweden.* Celsius. Frobes and Mairan.
" 20. *Sweden.* Celsius. Frobes and Mairan.
" 21. *Sweden.* Celsius. Frobes and Mairan.
" 27. *Paris.* Mairan. Pilgram.
" 27. *Sweden.* Celsius. Frobes.
" 28. *Sweden.* Celsius. Frobes and Mairan.
" 30. *Berlin.* Kirch. Mairan.
" 30. *Sweden.* Celsius. Frobes.
Oct. 3. *Sweden.* Celsius. Frobes and Mairan.
" 4. *St. Petersburg.* Kraft. The Delisles. Pilgram.
" 4. *Sweden.* Celsius. Frobes and Mairan.
" 5. *Huxham.* Plymouth. *Sweden.* Celsius.
" 5. Frobes, Mairan, Short, and Pilgram.
" 6. *Huxham.* Plymouth. Short.
" 6. *Sweden.* Celsius. Frobes and Mairan.
" 7. *Plymouth.* Huxham. *Wittemberg.* Weidler.
" 7. *Paris.* Mairan. *Abo.* Spöring.
" 7. *Sweden.* Celsius. Frobes and Pilgram.
" 8. *Berlin.* Kirch. *Abo.* Spöring.
" 8. *Sweden.* Celsius. Frobes and Mairan.
" 9. *St. Petersburg.* Kraft. The Delisles. Pilgram.
" 9. *Wittemberg.* Weidler. *Paris.* Mairan.
" 9. *Abo.* Spöring. Celsius and Frobes.
" 9. *Berlin.* Kirch.
" 10. *Paris.* Mairan. *Abo.* Spöring. Frobes.
" 11. *St. Petersburg.* Kraft. The Delisles.
" 11. *Sweden.* Celsius. Frobes and Mairan.
" 12. *Sweden.* Celsius. Frobes and Mairan.
" 12. *Abo.* Spöring. Pilgram.
" 14. Boué.
" 16. *Sweden.* Celsius. Frobes and Mairan.
" 17. *St. Petersburg.* Kraft. The Delisles.
" 17. *Sweden.* Celsius. Frobes and Mairan.
" 20. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 23. Mairan and Pilgram.
" 20. *Berlin.* Kirch. Celsius and Frobes.
" 21. Frobes and Mairan.
" 22. *St. Petersburg.* Kraft. Frobes and Mairan.
" 23. *St. Petersburg.* Kraft. The Delisles. Pilgram.
" 23. Mairan and Pilgram.
" 26. Frobes and Mairan.
Nov. 2. *Paris.* Mairan. *Berlin.* Kirch.
" 2. *St. Petersburg.* Kraft. The Delisles.
" 2. *Cambridge, Mass.* Winthrop and Greenwood.[1]
" 2. *Salem.* Felt. *Philadelphia.* Kahn.[2]
" 2. *Annapolis, Maryland.* Lewis.
" 2. *Sweden.* Celsius. Frobes and Thompson.
" 3. *Berlin.* Kirch. Mairan.

[1] Phil. Trans., XXXVII., 55.
[2] Svenska Vetensk. Acad. Handl. XIII. 145.

Nov. 3. *Sweden.* Celsius. Frobes and Pilgram.
" 4. *Sweden.* Celsius. Frobes and Mairan.
" 4. *Abo.* Spöring. Pilgram.
" 5. *St. Petersburg.* Kraft. The Delisles.
" 5. *Berlin.* Kirch. Phil. Trans.
" 5. *Sweden.* Celsius. Frobes and Mairan.
" 6. Phil. Trans. and Mairan.
" 7. *St. Petersburg.* Kraft.
" 7. The Delisles. Frobes and Mairan.
" 8. *Sweden.* Celsius. Frobes and Mairan.
" 9. *Sweden.* Celsius. Frobes and Mairan.
" 10. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 12. Celsius, Frobes, and Mairan.
" 14. *Abo.* Spöring. Celsius, Frobes, and Mairan.
" 17. *Sweden.* Celsius. Frobes and Mairan.
18. *Sweden.* Celsius. Frobes and Mairan.
" 19. Frobes and Mairan.
" 21. *Abo.* Spöring. Celsius, Frobes, and Mairan.
" 22. *Sweden.* Celsius. Frobes and Mairan.
" 25. Boué quotes from Celsius.
" 28. Frobes and Mairan.
" 30. *Sweden.* Celsius. Frobes, and Mairan.
" *x. Italy.* Beccari. Mairan.
Dec. 2. *Abo.* Spöring. Celsius, Frobes, and Mairan.
" 8. Frobes and Mairan.
" 9. *Abo.* Spöring. Frobes and Mairan.
" 14.[1] *St. Petersburg.* Kraft. The Delisles.
" 14. Celsius and Mairan.
" 17. *Abo.* Spöring. Celsius, Frobes, and Mairan.
" 23. Frobes and Mairan.
" 25. *Abo.* Spöring. Celsius, Frobes, and Mairan?
" 26. Frobes and Mairan.
" 28. Frobes and Mairan.

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Jan. 2. *St. Petersburg.* Kraft. The Delisles.
" 2. *Berlin.* Kirch. Mairan.
" 2. *Sweden.* Celsius. Frobes.
" 10. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 26. *Sweden.* Celsius. Frobes and Mairan.
Feb. 4. *Sweden.* Celsius.[2] Frobes and Mairan.
" 10. *Bologna.* Zanotti and Beccari.
" 10. *Sweden.* Celsius. Frobes and Mairan.
" 28. *Sweden.* Celsius. Frobes and Mairan.
Mar. 1. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 2. *Plymouth.* Huxham. Short.
" 2. *St. Petersburg.* Kraft. The Delisles.
" 2. *Sweden.* Celsius. Frobes and Mairan.

[1] Or 4. See Traite, &c., par Mairan, p. 495.
[2] Acta Lit. Sueciæ, III. B. 44.

Mar. 4. *Sweden.* Celsius. Frobes and Mairan.
" 7. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 7. *Sweden.* Celsius. Frobes and Phil. Trans.
" 8. *St. Petersburg.* The Delisles. Mairan.
" 9. *St. Petersburg?* Kraft.
" 9. *Sweden.* Celsius. Frobes and Mairan.
" 14. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 14. *Sweden.* Celsius. Frobes and Phil. Trans.
Apr. 3. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 24. Boué.
" 27. Mairan and Short.
May 7. *Plymouth.* Huxham.
" 14. Phil. Trans. and Mairan.
Aug. 21. *Sweden.* Celsius. Frobes and Mairan.
" 24. *Sweden.* Celsius. Frobes and Mairan.
" 27. *Plymouth.* Huxham. Short.
" 27. *Sweden.* Celsius. Frobes and Mairan.
" 28. *Wittemberg.* Weidler. Mairan.
" 29. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 30. *Sweden.* Celsius. Frobes and Mairan.
" 31. *Sweden.* Celsius. Frobes and Mairan.
" 31. *Wittemberg.* Weidler.
Sept. 1. *Sweden.* Celsius. Frobes and Mairan.
" 13. *Plymouth.* Huxham.
" 20. *Sweden.* Celsius. Frobes and Mairan.
" 24. *Plymouth.* Huxham. Short and Mairan.
" 26. *St. Petersburg.* Kraft. The Delisles.
" 26. *Berlin.* Kirch. Mairan.
" 26. *Sweden.* Celsius. Frobes and Pilgram.
" 27. *Paris?* Mairan. Celsius and Pilgram.
" 28. *Wittemberg.* Weidler.
" 28. *Paris?* Mairan. Pilgram.
" 29. *Paris?* Mairan. Pilgram.
" 30. *Paris?* Mairan. Pilgram.
" 30. *Sweden.* Celsius. Frobes.
Oct. *x.* Phil. Trans. and Mairan.
" *x.* Phil. Trans. and Mairan.
" 2. *St. Petersburg.* Kraft. The Delisles.
" 2. *Wittemberg.* Weidler. Mairan.
" 2. *Philadelphia.* Breintnal. Kahn and Pilgram.
" 3. *St. Petersburg.* Kraft. The Delisles.
" 3. *Berlin.* Kirch. Pilgram and Phil. Trans.
" 3. *Sweden.* Celsius. Frobes and Mairan.
" 4. *St. Petersburg.* Kraft. The Delisles.
" 4. *Berlin.* Kirch. *Wittemberg.* Weidler.
" 4. *Sweden.* Celsius. Frobes and Mairan.
" 4. Pilgram and Phil. Trans.
" 5. Pilgram.
" 7. *St. Petersburg.* Kraft. The Delisles.
" 7. *Berlin.* Kirch. *Wittemberg.* Weidler.

Oct. 7. *Sweden.* Celsius. Frobes and Mairan.
" 7. Pilgram and Phil. Trans.
" 8. *Plymouth.* Huxham. *Wittemberg.* Weidler.
" 8. *St. Petersburg.* Kraft. The Delisles.
" 8. *Italy.* Beccari. *Berlin.* Kirch.
" 8. *Sweden.* Celsius. Frobes.
" 8. Mairan, Pilgram, and Phil. Trans.
" 10. *Wittemberg.* Weidler. Mairan and Phil. Trans.
" 16. *Sweden.* Celsius. Frobes and Mairan.
" 23. *Wittemberg.* Weidler. *Berlin.* Kirch.
" 23. *Sweden.* Celsius. Frobes and Mairan.
" 23. Pilgram and Phil. Trans.
" 25. Mairan[1] and Pilgram.
" 28. *Paris.* Mairan. Pilgram.
" 29. Frobes and Mairan.
Nov. 2. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 4. *Sweden.* Celsius. Frobes and Mairan.
" 6. Phil. Trans and Mairan.
" 11. Celsius, Frobes, and Mairan.
" 17. *Sweden.* Celsius. Frobes and Mairan.
" 18. *Sweden.* Celsius. Frobes and Mairan.
" 27. *Sweden.* Celsius. Frobes and Mairan.
" 29. *Sweden.* Celsius. Frobes and Mairan.
" 30. Phil. Trans. and Mairan.
Dec. 1. *Sweden.* Celsius. Frobes and Mairan.
" 4. *Sweden.* Celsius. Frobes and Mairan.
" 5. ———. Mairan. Pilgram.
" 6. *Sweden.* Celsius. Frobes and Mairan.
" 7. *Sweden.* Celsius. Frobes and Mairan.
" 18. ———. Mairan. Pilgram.
" 20. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 21. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 27. *Sweden.* Celsius. Frobes and Mairan.
" 30. *Plymouth.* Huxham. Short.
" 30. *Sweden.* Celsius. Frobes and Mairan.
" 31. *Sweden.* Celsius.

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Jan. 1. *Sweden.* Celsius. Frobes and Mairan.
" 3. *Sweden.* Celsius. Frobes and Mairan.
" 4. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 5. *Sweden.* Celsius.[2]
" 6. *Sweden.* Celsius.
" 16. *Sweden.* Celsius. Mairan.[3]
" 17. *Sweden.* Celsius. Frobes and Mairan.
" 18. *Sweden.* Celsius. Frobes and Mairan.
" 26. *Wittemberg.* Weidler. Mairan.

[1] Mém. de l'Acad. 1731, p. 385.
[2] Acta Lit. Sueciæ, III. B. 44.
[3] Compare pp. 492 and 544, of Traité par Mairan.

Jan. 26. *Sweden.* Celsius. Frobes and Mairan.
" 27. *Sweden.* Celsius. Frobes and Mairan.
" 28. *Sweden.* Celsius. Frobes.
" 28. *Paris.* Mairan.[1]
" 29. *Plymouth.* Huxham. Short.
" 29. *St. Petersburg.* Kraft. The Delisles.
" 29. *Sweden.* Celsius. Frobes and Mairan.
" 30. *St. Petersburg.* Kraft. The Delisles.
" 30. *Sweden.* Celsius. Frobes and Mairan.
Feb. 2. *Sweden.* Celsius. Frobes and Mairan.
" 7. *Wittemberg.* Weidler. Mairan.
" 12. *Sweden.* Celsius. Frobes and Mairan.
" 17. *St. Petersburg.* Kraft. The Delisles.
" 17. *Sweden.* Celsius. Frobes and Mairan.
" 18. *Plymouth.* Huxham. Short.
" 18. *Sweden.* Celsius. Frobes and Mairan.
" 19. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 20. Frobes and Mairan.
" 21. Frobes and Mairan.
" 22. *St. Petersburg.* The Delisles. Mairan.
" 24. *Berlin.* Kirch. Mairan.
" 24. *Sweden.* Celsius. Frobes.
" 26. *Italy.* Beccari. Mairan.
" 27. *Sweden.* Celsius. Frobes and Mairan.
" 28. *St. Petersburg.* The Delisles. Mairan.
" 29. *St. Petersburg.* The Delisles.
" 29. *Berlin.* Kirch. Phil. Trans.
" 29. *Wittemberg.* Weidler. Mairan.
Mar. 1. Frobes and Mairan.
" 2. *Sweden.* Celsius. Frobes and Mairan.
" 3. *St. Petersburg.* The Delisles. Mairan.
" 12. *St. Petersburg.* The Delisles. Mairan.
" 13. *St. Petersburg.* The Delisles. Mairan.
" 14. Frobes and Mairan.
" 15. *Sweden.* Celsius. Frobes and Mairan.
" 18. Frobes and Mairan.
" 21. *St. Petersburg.* Kraft. The Delisles.
" 21. *Berlin.* Kirch. Phil. Trans.
" 21. *Sweden.* Celsius. Frobes and Mairan.
" 22. *St. Petersburg.* Kraft. The Delisles.
" 22. *Sweden.* Celsius. Frobes and Mairan.
" 23. *Sweden.* Celsius. Frobes.
" 23. *Paris.* Mairan.
" 24. *St. Petersburg.* The Delisles.
" 24. *Italy.* Beccari. Mairan.
" 24. *Sweden.* Celsius. Frobes.
" 25. *St. Petersburg.* The Delisles.
" 25. *Sweden.* Celsius. Frobes and Mairan.

[1] Mém. de l'Acad. 1733, p. 478.

Mar. 26. *Paris?* Mairan. Frobes.
" 27. *Sweden.* Celsius. Frobes and Mairan.
" 28. *St. Petersburg.* The Delisles.
" 28. *Berlin.* Kirch. *Paris?* Mairan.
" 28. *Sweden.* Celsius. Frobes.
" 29. *St. Petersburg.* The Delisles.
" 29. *Sweden.* Celsius. Frobes and Mairan.
" 31. *St. Petersburg.* The Delisles.
" 31. *Sweden.* Celsius. Frobes and Mairan.
Apr. 1. *St. Petersburg.* The Delisles. Celsius. Mairan.
" 2. *Sweden.* Celsius. Frobes and Mairan.
" 3. *St. Petersburg.* The Delisles. *Paris.* Mairan.
" 4. *St. Petersburg.* The Delisles. Mairan.
" 16. *Paris.* Mairan.
" 17. *Paris.* Mairan. *Sweden.* Celsius. Frobes.
" 18. *Sweden.* Celsius. *Paris.* Mairan. Frobes
" 19. *Sweden.* Celsius. Frobes and Mairan.
" 20. *Sweden.* Celsius. Frobes and Mairan.
" 22. *Sweden.* Celsius. Frobes and Mairan.
" 24. *Berlin.* Kirch. Mairan and Phil. Trans.
" 25. *Paris.* Mairan.
" 26. *Paris.* Mairan.
" 27. *Paris.* Mairan.
May 14. *Paris.* Mairan.
" 20. *Paris.* Mairan.
" 23. *Paris.* Mairan.
June 25. Frobes and Mairan.
" 26. *Paris.* Mairan. Frobes.
July 12. *Paris.* Mairan.
" 21. *Italy.* Beccari. Mairan.
" 27. *St. Petersburg.* The Delisles. Mairan.
Aug. 19. *Meudon.* Mairan.
" 22. *Wittemberg.* Weidler. *Berlin.* Kirch.
" 22. *Sweden.* Celsius. Phil. Trans.
" 22. *Paris.* Mairan. Frobes.
" 23. Celsius, Frobes, and Mairan.
" 27. *St. Petersburg.* Kraft.
" 30. *Paris.* Du Fay. Mairan.
Sept. 1. *St. Petersburg.* The Delisles.
" 1. *Paris.* Buache. Mairan and Thompson.
" 5. *Paris.* Mairan.
" 10. *Berlin.* Kirch. *Breuillepont.* Mairan.
" 10. Frobes and Phil. Trans.
" 11. *Breuillepont.* Mairan.
" 18. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 18. *Italy.* Veratti.[1]
" 19. *St. Petersburg.* The Delisles.
" 19. *Breuillepont.* Mairan. Frobes.
" 20. *St. Petersburg.* The Delisles.

[1] Comm. Bonon. II. Pt. III. 493.

Sept. 20. *Breuillepont.* Mairan. Frobes.
" 21. *St. Petersburg.* Kraft. *Breuillepont.* Mairan.
" 23. Frobes and Mairan.
" 24. Frobes and Mairan.
" 25. Frobes and Mairan.
" 26. *St. Petersburg.* The Delisles.
" 26. *Paris.* Mairan. Frobes.
" 27. *St. Petersburg.* The Delisles.
" 27. *Berlin.* Kirch. Mairan.
" 28. *St. Petersburg.* The Delisles. Mairan.
Oct. 1. *Paris.* Mairan.
" 2. *Paris.* Mairan.
" 3. *Paris.* Mairan.
" 5. *St. Petersburg.* The Delisles.
" 5. *Berlin.* Kirch. *Paris.* Mairan
" 5. *Sweden.* Celsius. Frobes.
" 6. *Paris.* Mairan.
" 7. *St. Petersburg.* The Delisles. Mairan.
" 12. *St. Petersburg.* The Delisles. Mairan.
" 14. *Paris.* Mairan.
" 15. *Paris.* Mairan. Frobes.
" 16. *Paris.* Mairan.
" 17. *Paris.* Mairan.
" 18. *St. Petersburg.* The Delisles. *Paris.* Mairan
" 19. *St. Petersburg.* The Delisles. Mairan.
" 20. *Paris.* Mairan.
" 22. *Berlin.* Kirch. *Paris.* Mairan.
" 22. *Sweden.* Celsius. Frobes.
" 23. *Wittemberg.* Weidler. *Paris.* Mairan.
" 23. *Berlin.* Kirch. Phil. Trans.
" 23. *Sweden.* Celsius. Frobes.
" 24. *Paris.* Mairan.
" 25. *St. Petersburg.* The Delisles. *Paris.* Mairan,
" 26. *St. Petersburg.* The Delisles. *Paris?* Mairan.
" 29. *St. Petersburg.* The Delisles. Mairan.
Nov. 1. *St. Petersburg.* The Delisles. Mairan.
" 4. *St. Petersburg.* The Delisles. *Paris.* Mairan.
" 5. *Paris.* Mairan.
" 9. *St. Petersburg.* Kraft. The Delisles.
" 9. *Paris.* Mairan.
" 11. *Sweden.* Celsius. Mairan.
" 12. *St. Petersburg.* The Delisles.
" 12. *Berlin.* Kirch. Frobes and Thompson.
" 12. *Copenhagen.* Horrebow. Mairan.
" 13. *St. Petersburg.* The Delisles. Frobes. Mairan.
" 14. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 15. *St. Petersburg.* The Delisles. Mairan.
" 19. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 20. *Italy.* Beccari. Frobes and Mairan.
" 21. *St. Petersburg.* The Delisles. Mairan.

Nov. 22. *St. Petersburg.* The Delisles. Mairan.
" 24. *St. Petersburg.* The Delisles. Mairan.
Dec. 7. *Sweden.* Celsius. Frobes and Mairan.
" 10. *St. Petersburg.* The Delisles. *Paris.* Mairan.
" 12. *Sweden.* Celsius. Frobes and Mairan.
" 13. *St. Petersburg.* The Delisles. Mairan.
" 16. *Sweden.* Celsius. Frobes and Mairan.
" 18. *Sweden.* Celsius. Frobes and Mairan.
" 19. *St. Petersburg.* The Delisles. Mairan.

1733.

Jan. 12. Celsius and Mairan.
" 17. Celsius and Mairan.
" 19. *Paris.* Mairan.
Feb. 13. *Plymouth.* Huxham. Mairan and Short.
" 14. *Paris.* Mairan.
" 16. *Paris.* Mairan.
Mar. 2. *Berlin.* Kirch. Celsius and Mairan.
" 3. *Berlin.* Kirch. Celsius and Mairan.
" 5. Celsius and Mairan.
" 17. Celsius and Mairan.
" 22. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 25. *St. Petersburg.* Kraft. The Delisles. Mairan.
Apr. 1. *Plymouth.* Huxham.
" 1. Celsius, Mairan, and Short.
" 2. *Paris.* Mairan.
" 13. Frobes and Mairan.
" 18. *Berlin.* Kirch. *Paris.* Mairan. Celsius.
May 6. *Paris.* Mairan.
" 9. *Paris.* Mairan.
" 14. Phil. Trans. and Mairan.
" 16. *Wittemberg.* Weidler. Phil. Trans.
" 16. *Paris.* Mairan.
" 20. *Paris.* Mairan.
July 7. *Italy.* Beccari. *Wittemberg.* Weidler.
" 7. *Berlin.* Kirch. *Paris.* Mairan.
" 7. Celsius. Frobes and Phil. Trans.
" 8. *Plymouth.* Huxham. Mairan and Short.
" 21. *Plymouth.* Huxham. Short.
" 21. *Paris.* Grandjean. Mairan.
Aug. 6. *Copenhagen.* Plelo.
" 7. *Paris.* Mairan.
" 14. *Paris.* Mairan.
" 17. *Berlin.* Kirch. *Paris.* Mairan.
" 29. *Paris.* Mairan.
Sept. 6. *Paris.* Mairan.
" 19. *Plymouth.* Huxham. Mairan and Short.
" 27. *Breuillepont.* Mairan.
" 2. *Breuillepont.* Mairan.
Oct. 3. *Berlin.* Kirch. *Breuillepont.* Mairan.
" 4. *Breuillepont.* Mairan.
" 6. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 7. *Breuillepont.* Mairan.
" 8. *Breuillepont.* Mairan.
" 9. *Breuillepont.* Mairan.
" 10. *Plymouth.* Huxham. *Berlin.* Kirch.
" 10. *Breuillepont.* Mairan. Short.
Nov. 7. *Plymouth.* Huxham. *Wittemberg.* Weidler.
" 7. *Berlin.* Kirch. *Paris.* Mairan.
" 7. Short and Phil. Trans.
" 11. *St. Petersburg.* Kraft. Mairan.
" 12. *St. Petersburg.* Kraft. The Delisles.
" 12. *Paris.* Mairan.
" 27. *Plymouth.* Huxham.
" 29. *Plymouth.* Huxham.
Dec. 8. *Plymouth.* Huxham. Short.
" 8. *Berlin.* Kirch. Mairan.
" 10. *Plymouth.* Huxham.
" 22. *Berlin.* Kirch. Mairan.
" 23. *Utrecht.* Musschenbroek. Pilgram.
" 30. *Paris.* Mairan.
" 31. *St. Petersburg.* Kraft. The Delisles. Mairan.

1734.

Jan. 8. *Berlin.* Kirch. *Paris.* Mairan.
" 23. *Lincopiæ.* Sparschuch.[1]
" 24. *Lincopiæ.* Sparschuch.
" 25. *Lincopiæ.* Sparschuch.
" 28. *Lincopiæ.* Sparschuch.
Feb. 2. *Wittemberg.* Weidler. Mairan.
" 3. *Berlin.* Kirch. *Lincopiæ.* Sparschuch.
" 3. *Utrecht.* Musschenbroek.[2]
" 3. *Paris.* Mairan.[3] Phil. Trans.
" 4. *Lincopiæ.* Sparschuch.
" 14. *Lincopiæ.* Sparschuch.
" 22. *Paris.* Mairan and Godin.[4]
" 22. *Lincopiæ.* Sparschuch.
" 23. *St. Petersburg.* Kraft. The Delisles.
" 23. Mairan and Thompson?
" 24. *Lincopiæ.* Sparschuch.
" 26. *Paris.* Mairan.
" 27. *Lincopiæ.* Sparschuch.
Mar. 1. *Berlin.* Kirch. Mairan.
" 5. *Lincopiæ.* Sparschuch.
" 8. *St. Petersburg.* Kraft. The Delisles.

[1] Acta Lit. Sueciæ, IV. 185.
[2] Mém. de l'Acad., 1734. p. 579.
[3] Ibid. p. 567.
[4] Mém. de l'Acad., 1734. p. 569.

Mar. 8. *Paris.* Mairan.
" 10. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 17. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 22. *St. Petersburg.* Kraft. The Delisles.
" 22. *Utrecht.* Musschenbroek. Mairan.
" 25. Mairan and Short.
" 26. Mairan and Short.
" 30. Mairan and Phil. Trans.
" 31. *Paris.* Mairan.
Apl. 5. *Paris.* Mairan.
" 7. *Utrecht.* Musschenbroek. *Paris.* Mairan.
" 8. *Wittemberg.* Weidler.
" 8. *Utrecht.* Musschenbroek. *Paris.* Mairan.
" 8. *Berlin.* Kirch.
" 9. *Utrecht.* Musschenbroek.
" 9. Phil. Trans. and Mairan.
" 10. *Bologna.* Zanotti. Mairan.
May 1. *Utrecht.* Musschenbroek.
" 4. *Utrecht.* Musschenbroek.
" 5. *Utrecht.* Musschenbroek.
" 6. *Utrecht.* Musschenbroek.
" 24. *Utrecht.* Musschenbroek. *Paris.* Maraldi.
" 25. *Plymouth.* Huxham. *Utrecht.* Musschenbroek.
" 26. *Plymouth.* Huxham. *Utrecht.* Musschenbroek.
" 27. *Utrecht.* Musschenbroek.
" 28. *Utrecht.* Musschenbroek.
" 29. *Utrecht.* Musschenbroek.
" 30. *Utrecht.* Musschenbroek.
" 31. *Utrecht.* Musschenbroek.
June 24. *Utrecht.* Musschenbroek.
July 2. *Paris.* Mairan.
" 5. *Utrecht.* Musschenbroek.
" 7. *Utrecht.* Musschenbroek.
" 8. *Utrecht.* Musschenbroek.
Aug. 6. *Utrecht.* Musschenbroek.
" 7. *Utrecht.* Musschenbroek.
" 20. *Wittemberg.* Weidler.
" 20. Mairan and Phil. Trans.
" 23. *Paris.* Mairan.
" 31. *Paris.* Mairan.
Sept. 1. *St. Petersburg.* The Delisles. Mairan.
" 2. *St. Petersburg.* The Delisles. Mairan.
" 3. *St. Petersburg.* The Delisles. Mairan.
" 8. *St. Petersburg.* The Delisles. Mairan.
" 9. *Plymouth.* Huxham.
" 18. *St. Petersburg.* The Delisles. Mairan.
" 19. *Berlin.* Kirch. Mairan.
" 19. *Lincopiæ.* Sparschuch.
" 19. *Paris.* Mairan. Frobes.
Sept. 20. *Plymouth.* Huxham. Short.
" 20. *Nointel.* Mairan.
" 21. *Utrecht.* Musschenbroek.
" 23. *St. Petersburg.* The Delisles.
" 23. *Nointel.* Mairan.
" 24. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 25. *Utrecht.* Musschenbroek.
" 27. *Utrecht.* Musschenbroek. *Nointel.* Mairan.
" 28. *Nointel.* Mairan.
" 29. *St. Petersburg.* The Delisles.
" 29. *Utrecht.* Musschenbroek. *Paris.* Mairan.
" 30. *St. Petersburg.* Kraft. The Delisles. Mairan.
Oct. 1. *St. Petersburg.* The Delisles. Mairan.
" 1. *Utrecht.* Musschenbroek.
" 2. *St. Petersburg.* Kraft. The Delisles.
" 2. *Utrecht.* Musschenbroek. Mairan.
" 4. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 5. *Utrecht.* Musschenbroek.
" 6. *St. Petersburg.* The Delisles.
" 6. *Utrecht.* Musschenbroek. Mairan.
" 14. *St. Petersburg.* Kraft. The Delisles.
" 14. *Utrecht.* Musschenbroek. Mairan.
" 15. *St. Petersburg.* Kraft.
" 16. *St. Petersburg.* The Delisles. Mairan.
" 17. *St. Petersburg.* The Delisles. Mairan.
" 19. *Paris.* Mairan.
" 20. *St. Petersburg.* The Delisles. Mairan.
" 21. *Paris.* Mairan.
" 23. *Paris.* Mairan.
" 25. *Paris.* Mairan.
" 26. *Paris.* Mairan.
" 27. *Paris.* Mairan.
" 28. *Paris.* Mairan.
" 29. *Paris.* Mairan.
" 30. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 31. *St. Petersburg.* Kraft. The Delisles. Mairan.
Nov. 14. *Paris.* Mairan.
" 15. *Paris.* Mairan.
" 19. *Paris.* Mairan.
" 22. *Paris.* Mairan.
" 26. *St. Petersburg.* The Delisles. Mairan.
Dec. 17. *Paris.* Mairan.
" 19. *Utrecht.* Musschenbroek.
" 25. *Utrecht.* Musschenbroek.
" 25. *Between Havre and Paris.* Bouguer.

1735.

Jan. 21. *Lincopiæ.* Sparschuch.
" 25. *Berlin.* Kirch. Mairan.

Jan. 26. *Wittemberg.* Weidler. *Berlin.* Kirch.
" 26. *Lincopiæ.* Sparschuch.
Feb. 4. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 13. *St. Petersburg.* The Delisles. Mairan.
" 21. *Italy.* Beccari. Mairan.
" 22. *Italy.* Beccari. Mairan.
" 22. *Wittemberg.* Weidler. Thompson.
" 24. *St. Petersburg.* The Delisles. Mairan.
Mar. 4. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 13. Frobes and Mairan.
" 15. Frobes and Mairan.
" 20. Frobes and Mairan.
" 22. Frobes and Mairan.[1]
" 23. *Wittemberg.* Weidler. *Berlin.* Kirch. Mairan.
" 24. *Wittemberg.* Weidler. *Berlin.* Kirch.
" 24. Frobes, Mairan, and Phil. Trans.
" 25. *Italy.* Beccari.
" 25. *Wittemberg.* Weidler. Mairan.
" 26. *St. Petersburg.* The Delisles. Mairan.
Apr. 16. *St. Petersburg.* The Delisles. Mairan.
" 17. *St. Petersburg.* The Delisles. Mairan.
" 18. *St. Petersburg.* The Delisles. Mairan.
" 18. *Wittemberg.* Weidler. *Lincopiæ.* Sparschuch.
" 19. *St. Petersburg.* The Delisles. Mairan.
" 20. Boué.
" 21. *St. Petersburg.* The Delisles. Mairan.
" 22. Frobes and Mairan.
" 23. *Wittemberg.* Weidler. *Berlin.* Kirch. Mairan.
" 25. Boué quotes from the Delisles.
Aug. 20. *Plymouth.* Huxham.
" 22. *St. Petersburg.* The Delisles. Mairan.
" 23. *St. Petersburg.* The Delisles. Mairan.
" 27. *St. Petersburg.* The Delisles. Mairan.
" 31. *Plymouth.* Huxham. Short.
" 31. *St. Petersburg.* The Delisles. Mairan.
Sept. 1. *St. Petersburg.* The Delisles. Mairan.
" 10. *St. Petersburg.* The Delisles. Mairan.
" 15. *St. Petersburg.* The Delisles. Mairan.
" 16. *St. Petersburg.* The Delisles. Mairan.
" 17. *St. Petersburg.* The Delisles. Mairan.
" 18. *St. Petersburg.* The Delisles. Mairan.
" 23. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 24. *St. Petersburg.* The Delisles. Mairan.
" 24. *Near London.* Celsius. Phil. Trans.
" 25. *St. Petersburg.* The Delisles. Mairan.
Oct. 3. *Plymouth.* Huxham.
" 11. *St. Petersburg.* Kraft. The Delisles. Mairan.

[1] Musschenbroek saw auroras from the 22d to 31st of March. See Musschenbroek, Introd. § 2496; or Encyc. Method. I. p. 369.

Oct. 14. *Plymouth.* Huxham. Mairan and Short.
" 15. *Bloomsburg.* Celsius.
" 15. Mairan, Short, and Phil. Trans.
" 22. *London.* Celsius. Mairan and Phil. Trans.
" 23. *St. Petersburg.* The Delisles. Mairan. Short.
" 24. *St. Petersburg.* The Delisles. Mairan.
Nov. 12. *Lincopiæ.* Sparschuch.
" 13. *Lincopiæ.* Sparschuch.
" 14. *Wittemberg.* Weidler. Mairan.
" 14. *St. Petersburg.* Kraft. The Delisles.
" 15. *Lincopiæ.* Sparschuch.
" 18. *Wittemberg.* Weidler. Frobes and Mairan.
Dec. 8. Frobes and Mairan.
" 10. *St. Petersburg.* The Delisles. Mairan.
" 13. Frobes and Mairan.
" 15. Frobes and Mairan.
" 18. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 20. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 22. *Peterborough.* Neve.[1]
" 22. *Edinburg.* Short. Mairan and Phil. Trans.

1736.[2]

Jan. 7. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 22. Celsius. Mairan and Phil. Trans.
Feb. 6. *Plymouth.* Huxham.
" 7. *Plymouth.* Huxham.
" 13. *St. Petersburg.* The Delisles. Mairan.
" 16. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 17. *Plymouth.* Huxham. *Lincopiæ.* Sparschuch.[3]
" 17. *St. Petersburg.* Kraft. The Delisles.
" 17. Frobes, Mairan, and Phil. Trans.
" 18. *Plymouth.* Huxham.
" 20. *Lincopiæ.* Sparschuch.
" 20. *Cambridge, Eng.* Celsius.
" 27. Mairan and Phil. Trans.
" 28. *St. Petersburg.* The Delisles. Mairan.
Mar. 1. *Plymouth.* Huxham.
" 15. *Italy.* Beccari. Mairan.
" 30. *St Petersburg.* The Delisles. Mairan.
" 30. *Lincopiæ.* Sparschuch.
Apr. 3. Mairan.[4]
" 5. *St. Petersburg.* Kraft. The Delisles.

[1] Phil. Trans. XL. 53.

[2] At Utrecht, 62 auroras were observed in this year. Dates not given. See letter of Musschenbroek to Du Fay. Mém. de l'Acad. 1736, p. 504.

[3] Acta Lit. Succiæ, IV. 249.

[4] See his general catalogue, p. 545 of Traité &c. Boué ascribes the observation incorrectly to the Delisles.

Apr. 5. *Wittemberg.* Weidler. Mairan.
" 14. *St. Petersburg.* The Delisles.
" 14. *Lincopiæ.* Sparschuch. *London.* Celsius.
" 14. Mairan and Phil. Trans.
May 4. *Italy.* Beccari. Mairan.
July 7. *Italy.* Beccari. Mairan.
" 8. *Italy.* Beccari. Mairan.
Aug. 13. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 15. *St. Petersburg.* The Delisles. Mairan.
" 20. *St. Petersburg.* The Delisles. Mairan.
" 25. *Plymouth.* Huxham.
" 29. *Plymouth.* Huxham.
Sept. 3. *Wittemberg.* Weidler. Mairan.
" 4. *Wittemberg.* Weidler. Mairan.
" 4. *Lincopiæ.* Sparschuch.
" 5. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 5. *Plymouth.* Huxham. Phil. Trans.
" 9. *Plymouth.* Huxham.
" 13. *St. Petersburg.* The Delisles. Mairan.
" 17. *Upsal.* Wallerius.[1]
" 24. *Upsal.* Wallerius.
" 25. *Upsal.* Wallerius. Phil. Trans.
" 25. *Italy.* Beccari. Mairan and Short.
" 26. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 27. *Upsal.* Wallerius.
" 29. *Lincopiæ.* Sparschuch.
" 29–30. *Upsal.* Wallerius.
" 30. *Italy.* Beccari. Mairan.
Oct. 1. *Upsal.* Wallerius. *Mt. Kittis.* Celsius.[2]
" 2. *Mt. Kittis.* Celsius.
" 3. *Mt. Kittis.* Celsius. *Upsal.* Wallerius.
" 4. *Mt. Kittis.* Celsius.
" 5. *Upsal.* Wallerius.
" 6. *Mt. Kittis.* Celsius.
" 7–8. *Upsal.* Wallerius.
" 7. *Mt. Kittis.* Celsius. Mairan.
" 7. *Lincopiæ.* Sparschuch.
" 7. *Plymouth.* Huxham. Short.
" 8. *Plymouth.* Huxham. Short.
" 8. *Mt. Kittis.* Celsius. Mairan.
" 10. *Wittemberg.* Weidler. Mairan.
" 20. *Upsal.* Wallerius.
" 22. Frobes and Mairan.
" 24. *Upsal.* Wallerius.
" 25. *Lincopiæ.* Sparschuch. *Tremblay.* Du Fay.[3]
" 26. *Wittemberg.* Weidler. Frobes and Mairan.
Oct. 26. *Lincopiæ.* Sparschuch.
" 27. *Wittemberg.* Weidler.
" 27. Frobes, Mairan, and Phil. Trans.
" 28. *Upsal.* Wallerius. *Mt. Kittis.* Celsius.
" 28. Frobes, Mairan, and Phil. Trans.
" 29. *Mt. Kittis.* Celsius.
" 29. Frobes, Mairan, and Phil. Trans.
" 30. Frobes and Mairan.
Nov. 7. *Plymouth.* Huxham. Mairan and Short.
" 8. Mairan and Short.
" 9. Mairan and Short.
" 17. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 18. *Plymouth.* Huxham. Mairan and Short.
" 19. *St. Petersburg.* The Delisles. Mairan.
" 19. *Plymouth.* Huxham. Short.
" 24. *Plymouth.* Huxham. *Lincopiæ.* Sparschuch.
" 24. *Edinburg.* Short.[1] Frobes and Mairan.
" 25. *Lincopiæ.* Sparschuch.
" *x.* Mairan.
Dec. 1. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 3. *Upsal.* Wallerius. *Mt. Kittis.* Celsius.
" 10. *Mt. Kittis.* Celsius.
" 12. *Tornea.* Celsius.
" 18. *Öfwer-Tornea.* Maupertius.[2]
" 18. *Upsal.* Wallerius.
" 19. *Tornea.* Celsius.
" 22. *Tornea.* Celsius. Thompson.
" 22. *Paris.* De Fouchy. Boué.
" 23. *Tornea.* Celsius.
" 24. *Tornea.* Celsius.
" 25. *Tornea.* Celsius.
" 31. *Tornea.* Celsius.

1737.

Jan. 1. *Italy.* Beccari. *Tornea.* Celsius. Mairan.
" 2. *Tornea.* Celsius.
" 3. *St. Petersburg.* The Delisles. Mairan.
" 3. *Tornea.* Celsius.
" 5. *Tornea.* Celsius.
" 6. *Tornea.* Celsius.
" 8. *Tornea.* Celsius.
" 9. *Tornea.* Celsius. Mairan. Phil. Trans.
" 9. *Salem.* Holyoke.[3]
" 9. *Philadelphia.* Breintnal.[4] Kahn.
" 12. *Tornea.* Celsius.
" 13. *Upsal.* Wallerius. *Tornea.* Celsius.

[1] Acta Lit. Sueciæ, IV. 220.
[2] Acta Lit. Sueciæ, IV. 254.
[3] Mém. de l'Acad. 1736, p. 505.

[1] Phil. Trans. XLI. Pt. I. 368.
[2] Oeuvres, III. 157.
[3] Felt's Salem, II. 137.
[4] Phil. Trans., XLI. Pt. I. 359.

Jan. 15. *Tornea.* Celsius.
" 19. *Tornea.* Celsius.
" 20. *Upsal.* Wallerius. *Lincopiæ.* Sparschuch.[1]
" 21. *Tornea.* Celsius.
" 22. *Upsal.* Wallerius. *Tornea.* Celsius.
" 24. *Italy.* Beccari. Mairan.
" 29. *Upsal.* Wallerius. *Tornea.* Celsius.
" 30. *Lincopiæ.* Sparschuch.
" 31. *Lincopiæ.* Sparschuch. *Tornea.* Celsius.
Feb. 1. *Lincopiæ.* Sparschuch.
" 2. *Tornea.* Celsius.
" 3. *Tornea.* Celsius.
" 5. *Tornea.* Celsius.
" 22. *Kiemi.* Celsius.
" 23. *Kiemi.* Celsius.
" 27. *Tornea.* Celsius.
" 28. *Upsal.* Wallerius.
Mar. 2. *Tornea.* Celsius.
" 3. *Tornea.* Celsius.
" 6. *Tornea.* Celsius.
" 18. *Plymouth.* Huxham. Mairan and Short.
" 21. Mairan, Short, and Phil. Trans.
" 28. *St. Petersburg.* Kraft. The Delisles. Mairan.[2]
" 28. *Wittemberg.* Weidler. Mairan.
" 29. *Plymouth.* Huxham. Short.
" 29. *Wittemberg.* Weidler. Mairan.
Apr. 3. *Mt. Kittis.* Celsius.
" 4. *Mt. Kittis.* Celsius.
" 6. *Mt. Kittis.* Celsius.
" 7. *Mt. Kittis.* Celsius.
" 7. *Wittemberg.* Weidler. Mairan.
" 10. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 11. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 22. *Tornea.* Celsius.
" 24. *St. Petersburg.* Kraft. The Delisles. Mairan.
June 3. *Italy.* Beccari. Mairan.
" 30. *Italy.* Beccari. Mairan.
Aug. 20. *Plymouth.* Huxham. Phil. Trans.
" 20. *Wittemberg.* Weidler. Mairan and Short.
" 21. *Italy.* Beccari. *Plymouth.* Huxham. Short.
" 21. *Wittemberg.* Weidler.
" 21. Mairan and Phil. Trans.
" 22. *Plymouth.* Huxham. Mairan and Short.
" 22. *Philadelphia, &c.* Kahn.[3] Phil. Trans.
" 23. *Plymouth.* Huxham. *Wittemberg.* Weidler.
" 23. *St. Petersburg.* Kraft. The Delisles.
" 23. Mairan, Short, and Phil. Trans.

[1] Acta Lit. Sueciæ, IV. 437.
[2] Comm. Petrop. IX. 359.
[3] Penn. Gazette.

Aug. 24. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 25. *Italy.* Beccari. Mairan.
" 25. *St. Petersburg.* Kraft. The Delisles.
Sept. 4. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 14. Mairan and Phil. Trans.
" 18. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 22. *Lincopiæ.* Sparschuch. Frobes and Mairan.
" 24. *Lincopiæ.* Sparschuch.
" 27. Mairan, Short, and Phil. Trans.
" 28. *Lincopiæ.* Sparschuch. Mairan.
" 28. Phil. Trans. and Short.
" 30. Mairan, Short, and Phil. Trans.
Oct. 1. Mairan, Short, and Phil. Trans.
" 2. Mairan and Phil. Trans.
" 23. *St. Petersburg.* Kraft. The Delisles. Mairan.
" 24. Mairan and Phil. Trans.
" 25. Mairan and Phil. Trans.
" 26. Mairan.[4] Boué.
Nov. 6. *Lincopiæ.* Sparschuch.
" 11. *Lincopiæ.* Sparschuch.
" 12. *Lincopiæ.* Sparschuch. *Plymouth.* Huxham.
" 18. *Plymouth.* Huxham.
" 26. *Wittemberg.* Weidler. Mairan.
" 30. Mairan and Phil. Trans.
Dec. 12. *Lincopiæ.* Sparschuch.
" 16. *Bologna.* Zanotti and Beccari.[1]
" 16. *Plymouth.* Huxham. *Wittemberg.* Weidler.
" 16. Frobes, Mairan, Thompson, and Phil. Trans.
" 19. *Montpelier.* Plantade. *Siberia.* Gmelin.[2]
" 20. Mairan and Phil. Trans.
" 21. *Italy.* Beccari. Mairan.
" 22. *Italy.* Beccari. Mairan.
" 28. *Italy.* Beccari. Frobes and Mairan.

1738.

Jan. 25. *Plymouth.* Huxham.
Feb. 12. *St. Petersburg.* Kraft.[3]
" 16. *Italy.* Beccari. Mairan.
" 19. Mairan and Short.
Mar. 8. *Lincopiæ.* Sparschuch. Mairan.[4]
" 18. Mairan, Short, and Phil. Trans.
" 19. Mairan.[4]
" 21. *Lincopiæ.* Sparschuch.
Apr. 10. Mairan, Short, and Phil. Trans.
" 16. *Plymouth.* Huxham.
July 11. *Italy.* Beccari. Mairan.

[1] Comm. Bonon. II. Pt. I. 476.
[2] Comm. Petrop. XI. 252. [3] Ibid. XI. 244.
[4] Mairan gives an aurora on these dates in his general catalogue (Traité, p. 545), but not in any special one.

Aug. 13. *Italy.* Beccari. Mairan.
" 19. *St. Petersburg.* Kraft.
Sept. 4. *St. Petersburg.* Kraft.
" 19. *St. Petersburg.* Kraft.
Oct. 12. *St. Petersburg.* Kraft.
" 27. *Lincopiæ.* Sparschuch.
" 28. *Lincopiæ.* Sparschuch.
Nov. 1. *Plymouth.* Huxham.
" 4. *Plymouth.* Huxham. *Lincopiæ.* Sparschuch.
" 5. *Plymouth.* Huxham.
" 7. *Plymouth.* Huxham.
" 11. *Lincopiæ.* Sparschuch.
Dec. 2. *St. Petersburg.* Kraft.
" 4. *Lincopiæ.* Sparschuch.
" 4. *Wittemberg.* Weidler. Mairan.
" 6. *St. Petersburg.* Kraft.
" 7. *Lincopiæ.* Sparschuch.
" 9. *Lincopiæ.* Sparschuch.
" 10. *Lincopiæ.* Sparschuch.
" 15. *Lincopiæ.* Sparschuch.
" 17. *Lincopiæ.* Sparschuch.
" 19. *Lincopiæ.* Sparschuch.
" 27. *Lincopiæ.* Sparschuch.

1739.

Jan. 2. *Lincopiæ.* Sparschuch.
" 4. *Lincopiæ.* Sparschuch.
" 8. Mairan and Short.
" 27. Frobes and Mairan.
" 30. *Upsal.* Celsius.[1]
" 30. *St. Petersburg.* Kraft.[2]
Feb. *x.* Frobes and Mairan.
" 1. *St. Petersburg.* Kraft.
" 9. *Upsal.* Celsius.
" 15. Mairan, Short, and Phil. Trans.
" 17. Frobes and Mairan.
" 27. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 27. *Wittemberg.* Weidler. Frobes and Mairan.
Mar. 5. *Upsal.* Celsius.
" 6. *Upsal.* Celsius. Mairan and Phil. Trans.
" 6. *Plymouth.* Huxham. Short.
" 7. Mairan and Phil. Trans.
" 8. *St. Petersburg.* Kraft.
" 10. *Bologna.* Zanotti and Beccari.
" 10. Frobes and Mairan.
" 11. *St. Petersburg.* Kraft.
" 12. *Plymouth.* Huxham. *Upsal.* Celsius.

[1] Mém. Etrang. Paris, IV. 137. Svenska Vetensk. Acad. I. 256.
[2] Comm. Petrop. XI. 255.

Mar. 12. *St. Petersburg.* Kraft. Mairan.
" 12. Frobes, Short, and Phil. Trans.
" 13. *St. Petersburg.* Kraft. *Siberia.* Gmelin.[1]
" 14. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 15. *St. Petersburg.* Kraft.
" 22. Frobes and Mairan.
" 26. *Plymouth.* Huxham.
" 27. *Upsal.* Celsius.
" 29. *Bologna.* Zanotti and Beccari. Oliva.[2]
" 29. *Chelsea.* Martyn. Phil. Trans.
" 29. *Padua.*[3] Poleni. Frobes and Mairan.
" 29. *St. Petersburg.* Kraft. *Siberia.* Gmelin.
" 30. *Upsal.* Celsius. *Siberia.* Gmelin.
Apr. 1. *Upsal.* Celsius.
" 4. *Upsal.* Celsius.
" 5. *Upsal.* Celsius.
" 9. *Philadelphia.* Breintnal. Kahn.
" 10. *Plymouth.* Huxham. *Siberia.* Gmelin.
" 10. *Wittemberg.* Weidler. Mairan.
" 10. *St. Petersburg.* Kraft.
" 20. *Upsal.* Celsius.
" 28. *Upsal.* Celsius.
" 29. *Upsal.* Celsius.
May 1. *Plymouth.* Huxham. *St. Petersburg.* Kraft.
" 2. *Upsal.* Celsius.
" 4. *Upsal.* Celsius.
June 2. *Bologna.* Zanotti. Matteucci and Mairan.
" 2. *Philadelphia.* Breintnal. Kahn.
Aug. 2. *Upsal.* Celsius.
" 10. *Upsal.* Celsius.
" 12. *Upsal.* Celsius.
" 21. *Upsal.* Celsius.
" 28. *St. Petersburg.* Kraft.
" 30. *Upsal.* Celsius.
" 31. *St. Petersburg.* Kraft.
Sept. 5. *Upsal.* Celsius.
" 6. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 7. *Upsal.* Celsius.
" 8. *Upsal.* Celsius.
" 9. *St. Petersburg.* Kraft.
" 23. *Plymouth.* Huxham. *Cambridge.* Winthrop.[5]
" 23. *Philadelphia.* Breintnal. Kahn.
" 23. *St. Petersburg.* Kraft.
" 24. *Plymouth.* Huxham.
" 24. Mairan, Short, and Phil. Trans.

[1] N. Comm. Petrop. VI. 458.
[2] Comm. Bonon. II. Pt. I. 479.
[3] Comm. Petrop. VIII. 440.
[4] Comm. Bonon. II. Pt. III. 496.
[5] Amer. Journ., XL. 206.

Sept.25. Mairan, Short, and Phil. Trans.
" 26. *Upsal.* Celsius.
" 26. Mairan, Short, and Phil. Trans.
" 27. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 28. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 28. *Wittemberg.* Weidler. Mairan.
" 29. Mairan, Short, and Phil. Trans.
" 30. *Upsal.* Celsius. Mairan and Phil. Trans.
Oct. 1. *Upsal.* Celsius.
" 3. *Upsal.* Celsius.
" 24. *Upsal.* Celsius.[1]
" 25. *Upsal.* Celsius.
" 29. *Upsal.* Celsius. Mairan and Short.
" 30. *Upsal.* Celsius. Mairan and Short.
" 31. *Upsal.* Celsius. *Wittemberg.* Weidler. Mairan.
Nov. 1. *Upsal.* Celsius.
" 2. *Upsal.* Celsius. Mairan and Phil. Trans.
" 4. *Upsal.* Celsius.
" 5. *Upsal.* Celsius.
" 11. *Upsal.* Celsius.
" 16. *Italy.* Beccari. Mairan.
" 23. *Upsal.* Celsius.
" 27. *Upsal.* Celsius.
Dec. 6. Mairan, Short, and Phil. Trans.
" 13. Mairan and Phil. Trans.
" 14. *Upsal.* Celsius.

1740.

Jan. 2. *St. Petersburg.* Kraft.
" 3. *St. Petersburg.* Kraft.
" 4. *Upsal.* Celsius.
" 23. *St. Petersburg.* Kraft.
" 25. *Upsal.* Celsius.[2]
" 27. *Rome.* Didacus de Revillas.[3] Boué.
" 27. Mairan and Phil Trans.
" 30. *Upsal.* Celsius.
Feb. 1. *Upsal.* Celsius.
" 23. *Upsal.* Celsius.
" 24. *Upsal.* Celsius.[4]
" 27. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 28. *Upsal.* Celsius.
Mar. 1. *St. Petersburg.* Kraft.

[1] This and the nine following observations of Celsius are not given in the Svenska Vetensk. Acad., but are contained in the Mém. Etrang. Paris, IV. 137.

[2] Svenska Vetensk. Acad. II. 67, and Acta Soc. Upsal. 1740, p. 38, &c.

[3] This appears to have been the *Aurora Australis.* Phil. Trans. XLI. 744.

[4] This and the observations of March 9 and 10, and of Aug. 29, are not given in the Acta Soc. Upsal.

Mar. 4. *Upsal.* Celsius.
" 9. *Upsal.* Celsius.
" 10. *Upsal.* Celsius.
" 11. *Upsal.* Celsius.
" 19. *Upsal.* Celsius.
" 23. *Upsal.* Celsius. *Plymouth.* Huxham.
" 23. *St. Petersburg.* Kraft.
" 24. *Upsal.* Celsius. *Plymouth.* Huxham.
" 24. *St. Petersburg.* Kraft.
" 25. *Plymouth.* Huxham. *St. Petersburg.* Kraft.
" 26. *Upsal.* Celsius.
May 22. *Upsal.* Celsius.
June 7. *Plymouth.* Huxham.
July 10. *Upsal.* Celsius.
Aug. 17. *Upsal.* Celsius.
" 21. *Upsal.* Celsius.
" 29. *Upsal.* Celsius.
Sept.12. *Upsal.* Celsius.
" 15. *Upsal.* Celsius.
" 22. *St. Petersburg.* Kraft.
" 25. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 26. *Upsal.* Celsius. *St. Petersburg.* Kraft.
Oct. 16. *Upsal.* Celsius.
" 17. Mairan, Short, and Phil. Trans.
" 20. *Upsal.* Celsius.
" 23. *Upsal.* Celsius.
" 24. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 27. *Upsal.* Celsius.
" 31. *Upsal.* Celsius.
Nov. 3. *Upsal.* Celsius. Thompson.
" 11. *Upsal.* Celsius.
" 16. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 18. *St. Petersburg.* Kraft.
Dec. 7. *Upsal.* Celsius.
" 18. *Upsal.* Celsius.
" 20. *Upsal.* Celsius.

1741.

Jan. 12. *Italy.* Beccari. Mairan.[1]
" 14. *Upsal.* Celsius and Hiorter.
" 19. *Upsal.* Celsius and Hiorter.
" 20. *Upsal.* Celsius and Hiorter.
" 21. *Upsal.* Celsius and Hiorter.
" 21. *St. Petersburg.* Kraft.
" 21. *Cambridge.* Winthrop.
" 23. *Upsal.* Celsius and Hiorter.

[1] In Mairan's special catalogue it stands, Jan. 13. Traité &c. p. 507.

[2] Svenska Vetensk. Acad. III. 14, and Acta Soc. Upsal. 1750, p. 100.

Jan. 23. *Wittemberg.* Weidler. Mairan.
" 24. *Upsal.* Celsius and Hiorter.
" 26. *St. Petersburg.* Kraft.
" 27. *St. Petersburg.* Kraft.
Feb. 2. *Upsal.* Celsius and Hiorter.
" 5. *Upsal.* Celsius and Hiorter.
" 7. *Upsal.* Celsius and Hiorter.
" 8. *Upsal.* Celsius and Hiorter.
" 9. *Upsal.* Celsius and Hiorter.
" 14. *St. Petersburg.* Kraft.
" 15. *St. Petersburg.* Kraft.
" 16. *Wittemberg.* Weidler. Mairan.
" 16. *St. Petersburg.* Kraft.
" 17. *Upsal.* Celsius and Hiorter.[1]
" 25. *Upsal.* Celsius and Hiorter.
Mar. 2. *Upsal.* Celsius and Hiorter.
" 5. *Upsal.* Celsius and Hiorter.
" 6. *St. Petersburg.* Kraft.
" 7. *Upsal.* Celsius and Hiorter.
" 11. *Upsal.* Celsius and Hiorter.[2]
" 11. Mairan and Phil. Trans.
" 12. *Upsal.* Celsius and Hiorter.
" 12. *St. Petersburg.* Kraft.
" 13. *Upsal.* Celsius and Hiorter.
" 16. *Plymouth.* Huxham. Mairan and Phil. Trans.
" 16. *Cambridge.* Winthrop.
" 17. Mairan and Phil. Trans.
" 19. *Upsal.* Celsius and Hiorter.
" 20. *Plymouth.* Huxham. Mairan and Phil. Trans.
" 26. *Upsal.* Celsius and Hiorter.
" 30. *Upsal.* Celsius and Hiorter.
Apr. 1. *Plymouth.* Huxham.
" 4. *Upsal.* Celsius and Hiorter.
" 6. *Upsal.* Celsius and Hiorter. Mairan. Short.
" 6. *Philadelphia.* Breintnal. Kahn.
" 6. *Cambridge.* Winthrop. *St. Petersburg.* Kraft.
" 9. *Upsal.* Celsius and Hiorter.
" 10. *Upsal.* Celsius and Hiorter.
" 12. *St. Petersburg.* Kraft.
" 13. *Upsal.* Celsius and Hiorter.
" 15. *Upsal.* Celsius and Hiorter.
" 16. *Upsal.* Celsius and Hiorter.
" 16. *St. Petersburg.* Kraft.
" 17. Mairan and Short.
" 18. *St. Petersburg.* Kraft.
July 10. *Plymouth.* Huxham.
" 23. *Plymouth.* Huxham.

[1] Not in Svenska Vetensk. Acad.
[2] Not in Acta Soc. Upsal.

July 23. *Upsal.* Celsius and Hiorter.
Aug. 8. *Upsal.* Celsius and Hiorter.
" 9. *Upsal.* Celsius and Hiorter.
" 10. *Upsal.* Celsius and Hiorter.
" 10. Mairan and Short.
" 13. *Upsal.* Celsius and Hiorter.
" 13. *Wittemberg.* Weidler. Mairan and Short.
" 14. *Upsal.* Celsius and Hiorter.
" 19. *Upsal.* Celsius and Hiorter.
" 20. *Upsal.* Celsius and Hiorter.
" 21. *Upsal.* Celsius and Hiorter.
" 22. *Upsal.* Celsius and Hiorter.
" 23. *Upsal.* Celsius and Hiorter.[1]
" 27. *Upsal.* Celsius and Hiorter.[2]
Sept. 4. *Upsal.* Celsius and Hiorter.
" 5. *Upsal.* Celsius and Hiorter.
" 6. *Upsal.* Celsius and Hiorter.
" 7. *Upsal.* Celsius and Hiorter.
" 8. *Upsal.* Celsius and Hiorter.
" 9. *Upsal.* Celsius and Hiorter.
" 9. *St. Petersburg.* Kraft.
" 10. *Upsal.* Celsius and Hiorter.
" 10. *St. Petersburg.* Kraft.
" 11. *Upsal.* Celsius and Hiorter.[3]
" 15. *Upsal.* Celsius and Hiorter.
" 15. *St. Petersburg.* Kraft.
" 18. *St. Petersburg.* Kraft.
" 19. *St. Petersburg.* Kraft.
Oct. 1. Mairan and Short.
" 2. *Upsal.* Celsius and Hiorter.
" 2. *Plymouth.* Huxham. Mairan and Short.
" 3. *Upsal.* Celsius and Hiorter.
" 3. Mairan and Short.
" 4. *Upsal.* Celsius and Hiorter.
" 5. *Upsal.* Celsius and Hiorter.[4]
" 6. *Cambridge.* Winthrop.
" 7. *Cambridge.* Winthrop.
" 7. *Upsal.* Celsius and Hiorter.[5]
" 8. *Upsal.* Celsius and Hiorter.
" 8. *Italy.* Beccari. Mairan.
" 8. *Plymouth.* Huxham. *Cambridge.* Winthrop.
" 8. *Gottingen.* Hollmann.[6]
" 9. *Upsal.* Celsius and Hiorter.
" 9. *Italy.* Beccari. *St. Petersburg.* Kraft.

[1] Not in Svenska Vetensk. Acad.
[2] Not in Acta Soc. Upsal.
[3] Not in Acta Soc. Upsal.
[4] Not in Svenska Vetensk. Acad.
[5] Not in Acta Soc. Upsal.
[6] Comm. Gott. III. 7.

Oct. 9. Mairan, Short, and Phil. Trans.
" 9. *Gottingen.* Hollmann.
" 10. *Upsal.* Celsius and Hiorter.
" 10. *St. Petersburg.* Kraft. Mairan and Short.
" 11. *Upsal.* Celsius and Hiorter.
" 12. *Upsal.* Celsius and Hiorter.
" 12. *St. Petersburg.* Kraft. Mairan and Short.
" 13. *Upsal.* Celsius and Hiorter.[1]
" 14. *Upsal.* Celsius and Hiorter.
" 14. Mairan and Short.
" 15. *Upsal.* Celsius and Hiorter.
" 15. Mairan and Short.
" 16. *Upsal.* Celsius and Hiorter.
" 17. *Upsal.* Celsius and Hiorter.
" 19. *Upsal.* Celsius and Hiorter.
" 28. *St. Petersburg.* Kraft.
Nov. 2. *Wittemberg.* Weidler.[2] Mairan.
" 4. *Upsal.* Celsius and Hiorter.
" 6. *Upsal.* Celsius and Hiorter.
" 9. *Wittemberg.* Weidler. Mairan.
" 11. *Upsal.* Celsius and Hiorter.
" 11. Mairan and Short.
" 12. *St. Petersburg.* Kraft.
" 12. *Upsal.* Celsius and Hiorter.[3]
" 14. *Upsal.* Celsius and Hiorter.
" 14. *St. Petersburg.* Kraft.
" 17. *Upsal.* Celsius and Hiorter.
" 29. *Upsal.* Celsius and Hiorter.
Dec. 1. *Upsal.* Celsius and Hiorter.
" 2. *Upsal.* Celsius and Hiorter.[4]
" 3. *Upsal.* Celsius and Hiorter.[1]
" 4. *St. Petersburg.* Kraft.
" 4. *Upsal.* Celsius and Hiorter.
" 7. *Upsal.* Celsius and Hiorter.
" 8. *St. Petersburg.* Kraft.
" 8. *Upsal.* Celsius and Hiorter.
" 12. *Upsal.* Celsius and Hiorter.
" 17. *Upsal.* Celsius and Hiorter.
" 18. *Upsal.* Celsius and Hiorter.
" 21. *St. Petersburg.* Kraft.
" 21. *Upsal.* Celsius and Hiorter.[5]

1742.

Jan. 2. Mairan and Short.
Jan. 3. *St. Petersburg.* Kraft.
" 9. *Upsal.* Celsius.[1]
Feb. 2. *Upsal.* Celsius.[2]
" 4. *Upsal.* Celsius.
" 9. *Upsal.* Celsius.
" 10. *Upsal.* Celsius.
" 11. *Upsal.* Celsius.
" 15. *Upsal.* Celsius.
" 25. *Wittemberg.* Weidler. Mairan.
" 26. *Upsal.* Celsius.
Mar. 1. *St. Petersburg.* Kraft.[3]
" 3. *Wittemberg.* Weidler. Mairan.
" 3. *Plymouth.* Huxham. *Siberia.* Gmelin.[4]
" 8. *Upsal.* Celsius.
" 9. *Upsal.* Celsius.
" 12. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 13. *St. Petersburg.* Kraft.
" 16. *Upsal.* Celsius. *Plymouth.* Huxham.
" 17. *Plymouth.* Huxham.
" 19. *Upsal.* Celsius.
" 25. *Upsal.* Celsius.
" 25. *St. Petersburg.* Kraft.
" 26. *Plymouth.* Huxham.
" 26. *Wittemberg.* Weidler. Mairan.
" 26. *St. Petersburg.* Kraft.
" 27. *Upsal.* Celsius. *Plymouth.* Huxham.
" 27. *Wittemberg.* Weidler. Mairan.
" 27. *St. Petersburg.* Kraft.
Apr. 2. *Siberia.* Gmelin.
" 4. *Plymouth.* Huxham.
" 4. *St. Petersburg.* Kraft.
" 9. *St. Petersburg.* Kraft.
" 10. *St. Petersburg.* Kraft.
" 12. *St. Petersburg.* Kraft.
" 13. *St. Petersburg.* Kraft.
" 16. *St. Petersburg.* Kraft.
" 22. *Cambridge.* Winthrop.[5] *St. Petersburg.* Kraft.
" 23. *Upsal.* Celsius.
" 23. *St. Petersburg.* Kraft. *Siberia.* Gmelin.
" 27. *Upsal.* Celsius.
May 23. *Wittemberg.* Weidler. Mairan.
Aug. 10. *Upsal.* Celsius.
" 12. *Upsal.* Celsius.
" 13. *Upsal.* Celsius.
" 26. *Upsal.* Celsius. *St. Petersburg.* Kraft.

[1] Neither this nor the next is in Acta Soc. Upsal.
[2] Mairan gives this and that of Nov. 9 in Weidler's special catalogue, but not in his own general catalogue. Compare pages 503 and 545 of his Traité &c.
[3] Not in Svenska Vetensk. Acad.
[4] Not in Svenska Vetensk. Acad.
[5] Not in Svenska Vetensk. Acad.

[1] Not in Acta Soc. Upsal.
[2] Svenska Vetensk. Acad. IV. 54.
[3] Comm. Petrop. XIV. 241.
[4] N. Comm. Petrop. XI. 323.
[5] Amer. Jour., XL. 204.

Aug. 26. *Wittemberg.* Weidler. Mairan.
" 27. *St. Petersburg.* Braun.
" 28. *Upsal.* Celsius.
" 30. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 30. *Wittemberg.* Weidler. Mairan.
" 31. *Upsal.* Celsius.
Sept. 6. *Upsal.* Celsius.
" 7. *Upsal.* Celsius.
" 7. *Wittemberg.* Weidler. Mairan.
" 10. *Wittemberg.* Weidler. Mairan.
" 19. *Upsal.* Celsius.
" 23. *Upsal.* Celsius.
" 25. *Upsal.* Celsius.
" 26. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 27. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 28. *Upsal.* Celsius.
" 29. *St. Petersburg.* Kraft.
Oct. 1. *Upsal.* Celsius.
" 3. *Upsal.* Celsius.
" 4. *Upsal.* Celsius.
" 8. *St. Petersburg.* Kraft. *Gottingen.* Hollmann.
" 22. Mairan and Short.
" 23. *Upsal.* Celsius.
" 23. *Cambridge.* Winthrop. Mairan and Short.
" 25. *Upsal.* Celsius.
" 26. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 27. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 28. *Upsal.* Celsius.
" 29. *Upsal.* Celsius. *St. Petersburg.* Kraft.
" 31. *Upsal.* Celsius.
Nov. 18. *Upsal.* Celsius.
" 19. *Upsal.* Celsius.
" 24. *St. Petersburg.* Kraft.
" 26. *St. Petersburg.* Kraft.
Dec. 16. *St. Petersburg.* Kraft.
" 17. *Upsal.* Celsius.
" 19. *Upsal.* Celsius.
" 22. *Wittemberg.* Weidler.
" 22. Mairan and Phil. Trans.
" 24. *St. Petersburg.* Kraft.
" 26. *Wittemberg.* Weidler. Mairan.
" 29. *Cambridge.* Winthrop. Lovering.[1]
" 30. *Cambridge.* Winthrop. Lovering.

1743.

Jan. 2. *Upsal.* Celsius.
" 3. *St. Petersburg.* Kraft.
" 4. *St. Petersburg.* Kraft.

[1] Mem. Amer. Acad. IX. 112.

Jan. 23. *Upsal.* Celsius.
" 23. *Cambridge.* Winthrop. Lovering.
" 23. *Plymouth.* Huxham.
" 30. *Wittemberg.* Weidler. Mairan.
Feb. 14. *Upsal.* Celsius.
" 18. *Upsal.* Celsius.
" 20. *Upsal.* Celsius.
" 26. *Upsal.* Celsius.
" 27. *Upsal.* Celsius.
Mar. 1. *Upsal.* Celsius.
" 15. *Upsal.* Celsius.
" 16. *Wittemberg.* Weidler. Mairan.
" 17. *Upsal.* Celsius.
" 18. *Upsal.* Celsius. *Plymouth.* Huxham.
" 19. *Wittemberg.* Weidler. Mairan.
" 20. *Wittemberg.* Weidler. Mairan.
" 20. *St. Petersburg.* Kraft.[2]
" 21. *St. Petersburg.* Kraft.
" 24. *Upsal.* Celsius.
" 24. *Italy.* Beccari. Mairan.
" 25. *Upsal.* Celsius.
" 26. *Wittemberg.* Weidler. Mairan.
" 28. *Upsal.* Celsius.
" 28. *Wittemberg.* Weidler. Mairan.
Apr. 3. *Upsal.* Celsius.
" 8. *Upsal.* Celsius.
" 12. *Upsal.* Celsius. *Plymouth.* Huxham.
" 12. *St. Petersburg.* Kraft.
" 13. *Upsal.* Celsius.
" 14. *Upsal.* Celsius.
" 20. *St. Petersburg.* Kraft.
" 21. *Upsal.* Celsius.
" 28. *St. Petersburg.* Kraft.
May 14. *Upsal.* Celsius.
July 9. *Plymouth.* Huxham.
Aug. 19. *Upsal.* Celsius.
" 22. *Upsal.* Celsius.
" 24. *Upsal.* Celsius.
" 26. *Upsal.* Celsius.
" 29. *Upsal.* Celsius.
Sept. 1. *St. Petersburg.* Kraft.
" 11. *Upsal.* Celsius.
" 18. *Upsal.* Celsius.
" 19. *Upsal.* Celsius.
" 19. *Wittemberg.* Weidler. Mairan.
" 22. *Upsal.* Celsius.
" 26. *Upsal.* Celsius.

[1] Svenska Vetensk. Acad. V. 145.
[2] Comm. Petrop. XIV. 248.

Sept. 28. *Upsal.* Celsius.
Oct. 1. *Upsal.* Celsius.
" 4. *Upsal.* Celsius.
" 7. *Upsal.* Celsius.
" 8. *Upsal.* Celsius.
" 8. *Wittemberg.* Weidler. Mairan.
" 10. *Upsal.* Celsius.
" 20. *Upsal.* Celsius.
" 25. *Upsal.* Celsius.
" 26. *Upsal.* Celsius.
Nov. 5. *Cambridge.* Winthop. Lovering.
" 7. *Upsal.* Celsius.
" 13. *St. Petersburg.* Kraft.
" 17. *Upsal.* Celsius.
" 19. *Upsal.* Celsius.
" 21. *Upsal.* Celsius.
Dec. 14. *Upsal.* Celsius.
" 17. *Upsal.* Celsius.
" 18. *Upsal.* Celsius.

1744.

Jan. 11. *Upsal.* Celsius.
Feb. 9. *Upsal.* Celsius.[1]
" 17. *Upsal.* Celsius.
Mar. 5. *Upsal.* Celsius.
" 6. *Upsal.* Celsius.
" 14. *Upsal.* Celsius.
Apr. 2. *Wittemburg.* Weidler. Mairan.
" 2. *Plymouth.* Huxham.
" 30. *Upsal.* Celsius.
June 7. *London.* Mairan and Phil. Trans.
" 13. *Upsal.* Celsius.
" 20. *South America. At Cusco* 12° *S. Lat.* Boué.[2]
" 27. *Upsal.* Celsius.
Sept. 8. *Upsal.* Celsius.
" 10. *Upsal.* Celsius.
Oct. 1. *Upsal.* Celsius.
" 3. *Italy.* Beccari. Mairan.
Nov. 10. *Upsal.* Celsius.
Dec. *x.* Mairan and Phil. Trans.
" *x.* Mairan and Phil. Trans.
" *x.* Mairan and Phil. Trans.
" *x.* Mairan and Phil. Trans.
" *x.* Mairan and Phil. Trans.
" 6. *Tubingen.* Kraft.[3]

[1] Svenska Vetensk. Acad. VI. 18.
[2] Mém. de l'Acad. 1747. p 17.
[3] N. Comm. Petrop. I. 144.

Dec. 25. *Plymouth.* Huxham.
" 28. *Upsal.* Celsius.
" 31. *Upsal.* Celsius.

1745.

Jan. 1. *Upsal.* Celsius.
" 4. *Plymouth.* Huxham.
" 21. *Wittemberg.* Weidler. Mairan.
" 27. *Upsal.* Celsius.[1]
" 28. *Upsal.* Celsius.
" 29. *Stuttgart.* Du Vernoi.[2]
Feb. 3. *Upsal.* Celsius.
" 19. *Upsal.* Celsius.
" 20. *Plymouth.* Huxham.
" 21. *Upsal.* Celsius.
" 23. *Upsal.* Celsius.
" 24. *Upsal.* Celsius.
" 26. *Upsal.* Celsius.
" 27. *Upsal.* Celsius.
June 13. *Tubingen.* Kraft.
Sept. 14. *Upsal.* Celsius.
" 18. *Upsal.* Celsius.
Oct. 7. *Upsal.* Celsius.
" 9. *Italy.* Beccari. Mairan.
" 17. *Italy.* Beccari. Mairan.
Nov. 28. *Upsal.* Celsius.
" 29. *Upsal.* Celsius.
Dec. 14. *Upsal.* Celsius.
" 15. *Upsal.* Celsius.
" 16. *Upsal.* Celsius.
" 17. *Upsal.* Celsius.
" 18. *Upsal.* Celsius.

1746.

Jan. 9. *Tubingen.* Kraft.
" 10. *Upsal.* Celsius.
" 11. *Upsal.* Celsius.
" 12. *Upsal.* Celsius.[3]
" 14. *Upsal.* Celsius.
" 20. *Upsal.* Celsius.
" 29. *Stuttgart.* Du Vernoi.
Feb. 10. *Upsal.* Celsius.
" 11. *Upsal.* Celsius. *Tubingen ?* Kraft.
" 12. *Upsal.* Celsius.
" 13. *Upsal.* Celsius.
" 14. *Upsal.* Celsius.

[1] Svenska Vetensk. Acad. VII. 72.
[2] N. Comm. Petrop. I. 144.
[3] Svenska Vetensk. Acad. VIII. 155.

Feb. 15. *Tubingen?* Kraft.
" 16. *Upsal.* Celsius.
" 20. *Plymouth.* Huxham.
" 21. *Upsal.* Celsius.
" 22. *Upsal.* Celsius.
" 24. *Upsal.* Celsius.
" 26. *Upsal.* Celsius.
Mar. 5. *Philadelphia.* Breintnal and Kalm.
" 9. *Upsal.* Celsius.
" 10. *Upsal.* Celsius. *Plymouth.* Huxham.
" 12. *Cambridge.* Winthrop. Lovering.
" 12. *Upsal.* Celsius. *Canada.* Gauthier. Kalm.
" 13. *Cambridge.* Winthrop. Lovering.
" 14. *Upsal.* Celsius.
" 20. *Upsal.* Celsius.
" 25. *Plymouth.* Huxham.
" 29. *Cambridge.* Winthrop. Lovering.
Apr. 12. *Upsal.* Celsius.
June 12. *Cambridge.* Winthrop. Lovering.[1]
" 12. *Quebec.* Gauthier. Kalm.
" 15. *Cambridge.* Winthrop. Lovering.[2]
July 4. *Cambridge.* Winthrop. Lovering.
Aug. 4. *Upsal.* Celsius.
Sept. 15. *Upsal.* Celsius.
" 18. *Upsal.* Celsius.
" 21. *Upsal.* Celsius.
" 23. *Upsal.* Celsius.
" 25. *Upsal.* Celsius.
" 26. *Upsal.* Celsius.
Oct. 12. *Upsal.* Celsius.
" 15. *Upsal.* Celsius.
" 16. *Upsal.* Celsius.
" 17. *Upsal.* Celsius.
" 18. *Upsal.* Celsius. *Plymouth.* Huxham.
" 19. *Upsal.* Celsius.
" 20. *Upsal.* Celsius.
" 21. *Upsal.* Celsius.
" 23. *Upsal.* Celsius.
" 25. *Upsal.* Celsius.
" 26. *Upsal.* Celsius.
" 27. *Upsal.* Celsius.
" 28. *Upsal.* Celsius.
" 31. *Upsal.* Celsius.
Nov. 2. *Tubingen.* Kraft.
" 3. *Tubingen.* Kraft.
" 4. *Tubingen.* Kraft.

[1] Mém. de l'Acad., 1747, p. 473.

[2] Force quotes from " Voyage to Hudson's Bay," II. 11, to the effect that auroras were seen, in Lat. 58° and Long. 49°, in June, &c., 1746.

Nov. 5. *Steinebrunn.* Bischoff.[1]
" 8. *Tubingen.* Kraft.
" 14. *Upsal.* Celsius.
" 15. *Upsal.* Celsius.
" 16. *Upsal.* Celsius.
" 17. *Wittemberg.* Weidler. Mairan.
" 21. *Tubingen.* Kraft.
Dec. 1. *Tubingen.* Kraft.
" 14. *Cambridge.* Winthrop. Lovering
" 14. *Upsal.* Celsius.
" 15. *Upsal.* Celsius.
" 18. *Upsal.* Celsius. *Tubingen.* Kraft.
" 27. *Upsal.* Celsius.
" 29. *Tubingen.* Kraft.

1747.

Jan. 3. *Upsal.* Celsius.
" 4. *Upsal.* Celsius. *Tubingen.* Kraft.
" 6. *Wittemberg.* Weidler. Mairan.
" 8. *Plymouth.* Huxham.
" 9. *Cambridge.* Winthrop. Lovering.
" 9. *Upsal.* Celsius.
" 10. *Upsal.* Celsius.
" 13. *Upsal.* Celsius.[2] *Plymouth.* Huxham.
" 18. *Upsal.* Celsius.
Feb. 2. *Tubingen.* Kraft.[3]
" 6. *Cambridge.* Winthrop. Lovering.
" 7. *Cambridge.* Winthrop. Lovering.
" 9. *Upsal.* Celsius.
" 24. *Tubingen.* Kraft.
Mar. 3. *Upsal.* Celsius.
" 6. *Upsal.* Celsius.
" 7. *Upsal.* Celsius.
" 10. *Upsal.* Celsius.
" 16. *Upsal.* Celsius.
" 19. Mairan and Phil. Trans.
" 20. *Upsal.* Celsius.
" 21. *Upsal.* Celsius.
" 28. *Upsal.* Celsius.
Apr. 2. *Upsal.* Celsius. *Plymouth.* Huxham.
" 3. *Upsal.* Celsius.
" 6. *Tubingen.* Kraft.
" 11. *Upsal.* Celsius.
" 19. *Tubingen.* Kraft.
May 29. *Cambridge.* Winthrop. Lovering.
July 5. *Cambridge.* Winthop. Lovering.

[1] N. Comm. Petrop. I. 149.

[2] Svenska Vetensk. Acad. XI. 276.

[3] N. Comm. Petrop. III. 390.

Aug. 29. *Cambridge.*[1] Winthrop. Lovering.
" 30. *Cambridge.* Winthrop. Lovering.
" 31. *Italy.* Beccari. Mairan.
Sept. 3. *Tubingen.* Kraft.
" 5. *Cambridge.* Winthrop. Lovering.
" 10. *Wittemberg.* Weidler. Mairan.
" 27. *Cambridge.* Winthrop. Lovering.
" 27. *Italy.* Beccari. Mairan.
Oct. 2. *Gottingen.* Hollmann.[2]
" 9. *Gottingen.* Hollmann.
Nov. 3. *Tubingen.* Kraft.
Dec. 2. *Plymouth.* Huxham.
" 3. *Wittemberg.* Weidler. Mairan.
" 4. *Steinebrunn.* Bischoff.[3]
" 5. *Steinebrunn.* Bischoff.
" 8. *Steinebrunn.* Bischoff.
" 13. *Steinebrunn.* Bischoff.
" 17. *Upsal.* Celsius. *Plymouth.* Huxham.
" 18. *Upsal.* Celsius.
" 24. *Italy.* Beccari. Mairan.
" 26. *Cambridge.* Winthrop. Lovering.

1748.

Jan. 1. *Steinebrunn.* Bischoff.
" 3. *Steinebrunn.* Bischoff.
" 6. *Steinebrunn.* Bischoff.
" 8. *Upsal.* Celsius.
" 9. *Steinebrunn.* Bischoff.
" 11. *Steinebrunn.* Bischoff.
" 13. *Steinebrunn.* Bischoff.
" 31. *Upsal.* Ferner.[4]
Feb. 2. *Plymouth.* Huxham.
" 3. *Cambridge.* Winthrop. Lovering.
" 5. *Steinebrunn.* Bischoff.
" 8. *Steinebrunn.* Bischoff.
" 16. *Upsal.* Ferner.
" 18. *Upsal.* Ferner.
" 19. *Upsal.* Ferner.
" 22. *Upsal.* Ferner.
" 27. *Wittemberg.* Weidler. Mairan.
Mar. 6. *Stuttgart.* Volzius.[5]
" 9. *Upsal.* Ferner.
" 12. *Steinebrunn.* Bischoff.
" 18. *Upsal.* Ferner.
" 19. *Upsal.* Ferner.

[1] Celsius says auroras were seen at Upsal often in August, and several times in Sept. Oct. and November.
[2] Comm. Gott. III. 43, &c. Also IV. 18, &c.
[3] N. Comm. Petrop. III. 391.
[4] Svenska Vetensk. Acad. XIII. 101.
[5] N. Comm. Petrop. III. 391.

Mar. 20. *Upsal.* Ferner.
" 21. *Upsal.* Ferner.
" 27. *Upsal.* Ferner.
" 28. *Upsal.* Ferner.
" 29. *Upsal.* Ferner.
Apr. 7. *Cambridge.* Winthrop. Lovering.
" 8. *Stuttgart.* Volzius.
" 9. *Stuttgart.* Volzius.
" 12. *Tubingen.* Kraft.
May 1. *Steinebrunn.* Bischoff.
" 8. *Stuttgart.* Volzius.
June 3. *Gottingen.* Hollmann.
" 14. *Tubingen.* Kraft.
Aug. 14. *Upsal.* Ferner.
" 19. *Upsal.* Ferner.
" 20. *Upsal.* Ferner.
" 26. *Upsal.* Ferner.
" 29. *Gottingen.* Hollmann.
" 30. *Cambridge.* Winthrop. Lovering.
Sept. 6. *Gottingen.* Hollmann.
" 8. *Plymouth.* Huxham.
" 11. *Upsal.* Ferner.
" 17. *Upsal.* Ferner.
" 18. *Upsal.* Ferner.
" 19. *Upsal.* Ferner.
" 21. *Upsal.* Ferner.
" 22. *Upsal.* Ferner.
" 23. *Upsal.* Ferner.
Oct. 8. *Steinebrunn.* Bischoff.
" 11. *Upsal.* Ferner.[1]
" 22. *Italy.* Beccari. Mairan.
" 29. *Steinebrunn.* Bischoff.
Nov. 1. *Cambridge.* Winthrop. Lovering.
" 28. *Steinebrunn.* Bischoff.[2]
Dec. 15. *Cambridge.* Winthrop. Lovering.
" 15. *Upsal.* Ferner. *Plymouth.* Huxham.
" 16. *Upsal.* Ferner.
" 17. *Upsal.* Ferner.
" 18. *Upsal.* Ferner.
" 20. *Cambridge.* Winthrop. Lovering.
" 20. *Near Philadelphia.* Kalm.
" 21. *Upsal.* Ferner.
" 23. *Upsal.* Ferner.
" 24. *Wittemberg.* Weidler. Mairan.
" 27. *Stuttgart.* Volzius.

1749.

Jan. 4. *Stuttgart.* Volzius.

[1] Auroras were seen at Upsal on two other days in October.
[2] Auroras were seen at Upsal six times in November.

Jan. 31. *Stuttgart.* Volzius.
Feb. 1. *Stuttgart.* Volzius.
" 9. *Upsal.* Ferner.
" 10. *Upsal.* Ferner.
" 11. *Upsal.* Ferner.
" 13. *Stuttgart.* Volzius.
" 15. *Near Philadelphia.* Kalm.
" 16. *Cambridge.* Winthrop. Lovering.
" 23. *Upsal.* Ferner.[1]
" 27. *Stuttgart.* Volzius.
Mar. 9. *Cambridge.* Winthrop. Lovering.
" 9. *Upsal.* Ferner.
" 10. *Upsal.* Ferner.
" 11. *Upsal.* Ferner. Wargentin.[2]
" 12. *Upsal.* Ferner.
" 13. *Upsal.* Ferner.
" 18. *Upsal.* Ferner.
" 20. *Upsal.* Ferner.
" 21. *Upsal.* Ferner. *Stuttgart.* Volzius.
" 21. *Steinebrunn.* Bischoff.
" 22. *Upsal.* Ferner.
" 23. *Upsal.* Ferner.
" 28. *Stuttgart.* Volzius.
" 29. *Stuttgart.* Volzius.
Apr. 1. *Stuttgart.* Volzius.
" 3. *Stuttgart.* Volzius.
" 5. *Upsal.* Ferner.
" 5. *Cambridge.* Winthrop. Lovering.
" 7. *Upsal.* Ferner.
" 10. *Gottingen.* Hollmann.
" 11. *Stuttgart.* Volzius.
" 12. *Gottingen.* Hollmann.
" 13. *Upsal.* Wargentin.
" 18. *Upsal.* Ferner. *Stuttgart.* Volzius.
" 18. *Cambridge.* Winthrop. Lovering.
" 20. *Stuttgart.* Volzius.
" 25. *Stuttgart.* Volzius.
" 27. *Stuttgart.* Volzius.
May 10. *Gottingen.* Hollmann.
" 11. *Cambridge.* Winthrop. Lovering.
" 14? *Stuttgart.* Volzius.
June 7. *Cambridge.* Winthrop. Lovering.
July 21. *Canada.* Kalm.
Aug. 16. *Upsal.* Ferner.
Sept. 4. *Upsal.* Ferner.
" 5. *Upsal.* Ferner.
" 7. *Upsal.* Ferner.

[1] Svenska Vetensk. Acad. XIII. 215.
[2] Acad. Coll. Etrang. Dijon. XI. 191. Svenska Vetensk. Acad. XI. 57.

Sept. 13. *Cambridge.* Winthrop. Lovering.
" 17. *Italy.* Beccari. Mairan.
" 22. *Italy.* Beccari. Mairan.
" 22. *Leipsic.* Heinsio.[1] *Gottingen.* Hollmann.
Oct. 3. *Tubingen.* Kraft. *Steinebrunn.* Bischoff.
" 8. *Upsal.* Ferner. *Italy.* Beccari. Mairan.
" 10. *Upsal.* Ferner.
" 11. *Upsal.* Ferner.
" 18. *Cambridge.* Winthrop. Lovering.
" 18. *Upsal.* Ferner.
" 27. *Upsal.* Ferner.
Nov. 6. *Cambridge.* Winthrop. Lovering.
" 6. *Upsal.* Ferner.
" 9. *Cambridge.* Winthrop. Lovering.
" 28. *Upsal.* Ferner.
Dec. 7. *Upsal.* Ferner.
" 12. *Upsal.* Ferner.
" 17. *Upsal.* Ferner.

1750.

Jan. 1. *Upsal.* Ferner.
" 5. *Upsal.* Ferner.
" 5. *Cambridge.* Winthrop. Lovering.
" 6. *Cambridge.* Winthrop. Lovering.
" 6. *Wittemberg.* Weidler. Mairan.
" 23. *Tooting.* Miles. Baker.[2] Reuss.
Feb. 3. *Leipsic.* Heinsio. *Upsal.* Ferner.[3]
" 3. *Italy.* Beccari. Mairan.
" 3. *Wittemberg.* Weidler. Thompson.
" 3. *Chelsea.* Martyn.[4] *Paris.* Fouchi.[5]
" 4. *Cambridge.* Winthrop. Lovering.
" 4. *Wittemberg.* Weidler. Mairan.
" 4. *Gottingen.* Hollman.
" 7. *Italy.* Beccari. Mairan.
" 9. *Upsal.* Ferner.
" 10. *Upsal.* Ferner. *Gottingen.* Hollmann.
" 14. *Tubingen.* Kraft.[6] *Steinebrunn.* Bischoff.
" 26. *Upsal.* Ferner. *Plymouth.* Huxham.
" 26. Mairan, Reuss, and Phil. Trans.
" 27. *Upsal.* Ferner. Thompson.
" 27. *Cambridge.* Winthrop. Lovering.
" 27. *Wittemberg.* Weidler. Mairan. Reuss.

[1] N. Comm. Petrop. IV. 477.
[2] Phil. Trans. XLVI. 346 & 399, where it is accidentally put down for Jan. 23, 1751, though the communication bears an earlier date.
[3] Svenska Vetensk. Acad. XIV. 255.
[4] Phil. Trans. XLVI. 319.
[5] Encyc. Method. I. 353.
[6] N. Comm. Petrop. V. 403.

Feb. 27. *Philadelphia.* Kalm. *Chelsea.* Martyn.[1]
" 27. *Plymouth.* Huxham. *The Hague.* Gabry.[2]
Mar. 4. *Cambridge.* Winthrop. Lovering.
" 4. *Upsal.* Ferner. *Gottingen.* Hollmann.
" 7. *Upsal.* Ferner.
" 9. *Upsal.* Ferner.
" 11. *Cambridge.* Winthrop. Lovering.
" 11. *Upsal.* Ferner.
" 12. *Upsal.* Ferner.
" 14. *Upsal.* Ferner.
" 15. *Steinebrunn.* Bischoff.
Apr. 3. *Italy.* Beccari. Mairan.[3]
" 8. *Cambridge.* Winthrop. Lovering.
" 8. *Upsal.* Ferner.
" 9. *Cambridge.* Winthrop. Lovering.
" 9. *Upsal.* Ferner.
" 14. *Cambridge.* Winthrop. Lovering.
" 14. *Philadelphia.* Kahn.
" 30. *Cambridge.* Winthop. Lovering.
" 30. *Philadelphia.* Kalm.
" 30. *Stockholm.* Ekeberg.[4] *South Carolina, U. S.*[5]
May 1. *Cambridge.* Winthrop. Lovering.
" 2. *Wittemberg.* Weidler. Mairan.
" 12. *Tubingen.* Kraft. *Steinebrunn.* Bischoff.
July 26. *Cambridge.* Winthrop. Lovering.
" 26. *Leipsic.* Heinsio.
" 28. *Cambridge.* Winthrop. Lovering.
Aug. 10. *Upsal.* Ferner.
" 16. *Upsal.* Ferner.
" 17. *Upsal.* Ferner.
" 24. *Upsal.* Ferner. *Gottingen.* Hollmann.
" 24. *Wittemberg.* Weidler. Mairan.
" 26. *Cambridge.* Winthrop. Lovering.
" 26. *Bologna.* Zanotti and Beccari. Mairan.
" 26. Reyger. Boué.[6] Reuss.
" 27. *Italy.* Beccari. Mairan.
" 29. *Upsal.* Ferner.
Sept. 4. *Cambridge.* Winthrop. Lovering.
" 6. *Tubingen.* Kraft.
" 22. *Upsal.* Ferner. *Leipsic.* Heinsio.
" 23. *Upsal.* Ferner.
Oct. 12. *Upsal.* Ferner.
" 20. *Upsal.* Ferner.
Nov. 2. *Cambridge.* Winthrop. Lovering.
" 4. *Cambridge.* Winthrop. Lovering.
" 5. *Upsal.* Ferner. *Gottingen.* Hollmann.

[1] Phil. Trans. XLVI. 345.
[2] Phil. Trans. XLVII. 39.
[3] In his general catalogue, it is April 13. Traité &c. p. 546.
[4] Acad. Coll. Etrang. Dijon. XI. 191. [5] Gent. Mag. XX. 428.
[6] Nat. Gesell. Danzig. Abh. III. 258.

Nov. 6. *Upsal.* Ferner.
" 20. *Tubingen.* Kraft.
Dec. 14. *Italy.* Beccari. Mairan.
" 19. *Gottingen.* Hollmann.
" 28. *Gottingen.* Hollmann.
" 31. *Upsal.* Ferner.

1751.

Jan. 8. *Steinebrunn.* Bischoff.
" 11. *Tubingen.* Kraft.
Feb. 11. *Gottingen.* Hollmann.
" 12. *Cambridge.* Winthrop. Lovering.
" 19. *Wittemberg.* Weidler. Mairan.
" 19. *Cambridge.* Winthrop. Lovering.
" 22. *Steinebrunn.* Bischoff.[1]
" 24. *Cambridge.* Winthrop. Lovering.
Mar. 17. *Upsal.* Ferner.[2]
Apr. 2. *Cambridge.* Winthrop. Lovering.
" 2. *Upsal.* Ferner.
June 10. *Tubingen.* Kraft.
" 27. *Cambridge.* Winthrop. Lovering.
Aug. 19. *Italy.* Beccari. Mairan.
Sept. 14. *Tubingen.* Kraft.
" 22. *Upsal.* Ferner.
" 26. *Upsal.* Ferner.
" 27. *Upsal.* Ferner.
" 30. *Tubingen.* Kraft.
Oct. 22. *Upsal.* Ferner.
" 23. *Upsal.* Ferner. Thompson.[3]
" 27. *Upsal.* Ferner.
" 28. *Upsal.* Ferner.
" 30. *Upsal.* Ferner.
Nov. 2. *Upsal.* Ferner.
" 3. *Upsal.* Ferner. *Steinebrunn.* Bischoff.
" 6. *Upsal.* Ferner.
" 8. *Upsal.* Ferner.
Dec. 2. *Upsal.* Ferner.
" 8. *Upsal.* Ferner.
" 9. *Upsal.* Ferner.
" 10. *Upsal.* Ferner.
" 11. *Upsal.* Ferner. *Tubingen.* Kraft.
" 13. *Upsal.* Ferner.
" 19. *Upsal.* Ferner.
" 25. *Upsal.* Ferner.

1752.

Jan. 9. *Upsal.* Ferner.

[1] N. Comm. Petrop. V. 405.
[2] Svenska Vetensk. Acad. XV. 175.
[3] Annals of Phil. 1814. IV. 427.

Jan. 13. *Upsal.* Ferner.[1]
" 15. *Upsal.* Ferner.
" 16. *Upsal.* Ferner.
" 19. *Cambridge.* Winthrop. Lovering.
" 19. *Upsal.* Ferner.
" 20. *Upsal.* Ferner.
" 21. *Upsal.* Ferner.
" 22. *Upsal.* Ferner.
" 29. *Steinebrunn.* Bischoff.
Feb. 10. *Upsal.* Ferner.
" 12. *Upsal.* Ferner.
" 16. *Upsal.* Ferner.
" 17. *Upsal.* Ferner.
" 18. *Upsal.* Ferner.
Mar. 4. *Upsal.* Ferner.
" 7. *Upsal.* Ferner.
" 8. *Upsal.* Ferner. *Tubingen.* Kraft.
" 8. *Gottingen.* Hollmann.
" 10. *Upsal.* Ferner.
" 11. *Upsal.* Ferner. *Tubingen.* Kraft.
" 12. *Upsal.* Ferner.
" 13. *Upsal.* Ferner.
" 16. *Upsal.* Ferner.
" 17. *Upsal.* Ferner. *Tubingen.* Kraft.
" 18. *Upsal.* Ferner.
" 27. *Upsal.* Ferner.
May 17. *Steinebrunn.* Bischoff.
" 24. *Tubingen.* Kraft.
" 28. *Stuttgart.* Volzius.[2]
July 27. *Tubingen.* Kraft.
Aug. 1. *Tubingen.* Kraft.
" 11. *Tubingen.* Kraft.
" 12. *Tubingen.* Kraft.
" 13. *Tubingen.* Kraft.
" 15. *Stuttgart.* Volzius. *Steinebrunn.* Bischoff.
Sept. 3. *Tubingen.* Kraft.
" 8. *Upsal.* Ferner.
" 27. *Upsal.* Ferner.
Oct. 2. *Upsal.* Ferner.
" 3. *Upsal.* Ferner. *Gottingen.* Hollman.
" 5. *Upsal.* Ferner.
" 6. *Gottingen.* Hollmann.
" 7. *Upsal.* Ferner. *Gottingen.* Hollmann.
" 12. *Upsal.* Ferner.
" 12. *Cambridge.* Winthrop. Lovering.
" 13. *Gottingen.* Hollmann.
" 14. *Upsal.* Ferner.

[1] Svenska Vetensk. Acad. XVI. 290.
[2] N. Comm. Petrop. V. 410.

Oct. 24. *Stuttgart.* Volzius.
Nov. 2. *Upsal.* Ferner.
" 3. *Upsal.* Ferner.
" 10. *Upsal.* Ferner.
" 11. *Upsal.* Ferner.
" 28. *Tubingen.* Kraft.
Dec. 4. *Upsal.* Ferner.
" 5. *Upsal.* Ferner.
" 6. *Upsal.* Ferner.
" 7. *Upsal.* Ferner.
" 25. *Tubingen.* Kraft.

1753.

Feb. 23. *Upsal.* Ferner.[1]
" 26. *Upsal.* Ferner.
" 28. *Upsal.* Ferner.
Mar. 1. *Upsal.* Ferner.[2]
" 2. *Upsal.* Ferner.
" 3. *Upsal.* Ferner.
" 4. *Upsal.* Ferner.
" 7. *Upsal.* Ferner.
" 8. *Upsal.* Ferner.
" 9. *Upsal.* Ferner.
" 11. *Upsal.* Ferner.
" 12. *Upsal.* Ferner.
" 25. *Upsal.* Ferner.
Apr. 2. *Upsal.* Ferner.
" 3. *Upsal.* Ferner.
" 10. *Upsal.* Ferner.
" 11. *Upsal.* Ferner.
" 12. *Upsal.* Ferner.
" 14. *Upsal.* Ferner.
" 20. *Upsal.* Ferner. *Gottingen.* Hollmann.
" 30. *Upsal.* Ferner.
" 30. *Cambridge.* Winthrop. Lovering.
Aug. 17. *Upsal.* Ferner.
" 23. *Upsal.* Ferner.
Sept. 1. *Upsal.* Ferner.
" 2. *Upsal.* Ferner.
" 3. *Gottingen.* Hollmann.
" 12. *Upsal.* Ferner.
" 29. *Upsal.* Ferner.
" 30. *Upsal.* Ferner.
Nov. 25. *Upsal.* Ferner.

[1] Svenska Vetensk. Acad. XVI. 290.
[2] The Gregorian Calendar was adopted in Sweden in 1753, the 17th of February being followed by the 1st of March. Therefore the dates commencing with March 1st are published here as given by Ferner. All the previous dates were reduced from OLD STYLE to new style.

Dec. 15. *Upsal.* Ferner.
" 16. *Upsal.* Ferner.
" 18. *Upsal.* Ferner.
" 27. *Upsal.* Ferner.
" 28. *Upsal.* Ferner.

1754.[1]

Jan. 12. *Upsal.* Ferner.[2]
Feb. 8. *Upsal.* Ferner.
" 24. *Upsal.* Ferner.
Mar. 17. *Upsal.* Ferner.
" 18. *Upsal.* Ferner.
" 20. *Upsal.* Ferner.
" 25. *Upsal.* Ferner.
" 26. *Upsal.* Ferner.
Apr. 9. *Upsal.* Ferner.
" 10. *Upsal.* Ferner.
Sept. 23. *Upsal.* Ferner.
Oct. 9. *Upsal.* Ferner.
" 16. *Upsal.* Ferner.
" 27. *The Hague.* Gabry.[3] Reuss and Boué.
Nov. 15. *Upsal.* Ferner.
" 16. *Upsal.* Ferner.
" 17. *Upsal.* Ferner.
Dec. 31. *Upsal.* Ferner.

1755.

Jan. 30. *At Sea, near Norway.* Ekeberg.[4] Reuss.
Feb. 3. *Upsal.* Ferner.[5]
" 5. *Upsal.* Ferner.
" 8. *St. Petersburg.* Braun[6].
Sept. 9. *Upsal.* Ferner.
Oct. 5. *Upsal.* Ferner.
" 24. *Upsal.* Ferner.
" 30. *Upsal.* Ferner.
Nov. 1. *Upsal.* Ferner.
" 28. *Upsal.* Ferner.
Dec. 31. *Upsal.* Ferner.[7]

1756.[8]

Feb. 18. *Upsal.* Ferner.[9]
" 19. *Upsal.* Ferner.
Mar. 28. *Upsal.* Ferner.
Apr. 2. *Upsal.* Ferner.
" 11. *Upsal.* Ferner.
Sept. 1. *Upsal.* Ferner.
" 14. *Upsal.* Ferner.
" 15. *Upsal.* Ferner.
" 22. *St. Petersburg.* Braun.
" 28. *Upsal.* Ferner.
" 29. *Upsal.* Ferner.
" 30. *Upsal.* Ferner.
Oct. 20. *Upsal.* Ferner.
" 25. *Upsal.* Ferner.
" 26. *Upsal.* Ferner.

1757.

Jan. 5. *St. Petersburg.* Braun.
Mar. 31. *Rouen.*[1] Bouin. Boué. Reuss.
Aug. 13. *Cambridge.* Winthrop. Lovering.
Sept. 7. *Cambridge.* Winthrop. Lovering.
" 13. *Cambridge.* Winthrop. Lovering.
" 14. *Cambridge.* Winthrop. Lovering.
" 16. *The Hague.* Gabry. Boué.[2] Reuss.
Nov. 12. *Cambridge.* Winthrop. Lovering.
" 12. *Philadelphia.* Bartram.[3] Reuss.
" 13. *Cambridge.* Winthrop. Lovering.
" 13. *London.* Franklin.

1758.

Jan. 8. *Cambridge.* Winthrop. Lovering.
Mar. 12. *Cambridge.* Winthrop. Lovering.
" 26. *St. Petersburg.* Braun.[4]
" 31. *Cambridge.* Winthrop. Lovering.
Apr. 1. *Cambridge.* Winthrop. Lovering.
May 19. *Spitzbergen.* Martin.[5]
June 2. *Spitzbergen.* Martin.
" 26. *Spitzbergen.* Martin.
" 27. *Spitzbergen.* Martin.
" 28. *Spitzbergen.* Martin.

1759.

Feb. 3. *Upsal.* Bergman.[6]
" 4. *Upsal.* Bergman. Thompson.
" 4. *Hernosand.* Gisler. Boué.
" 15. *Upsal.* Bergman. Thompson.
" 15. *Hernosand.* Gisler. Boué.

[1] An aurora was seen at *Constantinople* in 1754. Phil. Trans. XLIX. 119.
[2] Svenska Vetensk. Acad. XVI. 290.
[3] Mém. de l'Acad. Sav. Etrang. III. 581.
[4] Svenska Vetensk. Acad. XVIII. 61.
[5] Svenska Vetensk. Acad. XVIII. 208.
[6] N. Comm. Petrop. VII. 405.
[7] Aurora Australis.
[8] Once in *Upsal* in January.
[9] Svenska Vetensk. Acad. XIX. 231.

[1] Mém. de l'Acad. Sav. Etrang. IV. 242.
[2] Mém. de l'Acad. Sav. Etrang. IV. 597.
[3] Phil. Trans. LII. 474.
[4] N. Comm. Petrop. IX. 418.
[5] Svenska Vetensk. Acad. XIX. 315.
[6] Nova Acta Sci. Upsal. I. 418 and Phil. Trans. LII. 479.

Feb. 18. *Upsal.* Bergman.
" 19. *Upsal.* Bergman.
" 20. *Upsal.* Bergman. *Rouen.* Bouin.[1] Reuss.
Mar. 8. *Cambridge.* Winthrop. Lovering.
" 17. *Upsal.* Bergman.
" 18. *Upsal.* Bergman. *St. Petersburg.* Braun.[2]
" 22. *Upsal.* Bergman.
" 28. *Upsal.* Bergman.
Apr. 5. *Upsal.* Bergman.
" 16. *Upsal or Stockholm.* Bergman.
" 22. *St. Petersburg.* Braun.
Aug. 16. *Upsal.* Bergman.
" 26. *Upsal.* Bergman.
" 27. *Upsal.* Bergman.
" 28. *Upsal.* Bergman.
" 29. *Upsal.* Bergman.[3]
Sept. 9. *Cambridge.* Winthrop. Lovering.
" 10. *Upsal.* Bergman.
" 11. *Upsal.* Bergman.
" 11. *Cambridge.* Winthrop. Lovering.
" 12. *Upsal.* Bergman.
" 15. *Upsal.* Bergman.
" 16. *Upsal.* Bergman. *Rouen.* Bouin. Reuss.[4]
" 16. *North Germany.* Hartmann. Boué.[5]
" 18. *Cambridge.* Winthrop. Lovering.
" 19. *Upsal.* Bergman.
" 20. *Upsal.* Bergman.
" 21. *Upsal.* Bergman.
" 22. *Upsal.* Bergman.
" 23. *Upsal.* Bergman.
" 24. *Upsal.* Bergman.
Oct. 13. *Upsal.* Bergman.
" 15. *Upsal.* Bergman.[6]
" 31. *St. Petersburg.* Braun.
" 31. *Cambridge.* Winthrop. Lovering.
Nov. 5. *Upsal.* Bergman.
" 9. *Upsal.* Bergman.
" 15. *Upsal.* Bergman.
" 16. *Upsal.* Bergman.
" 20. *Upsal.* Bergman.
" 21. *Upsal.* Bergman.
" 22. *Upsal.* Bergman.
" 27. *Upsal.* Bergman.
" 28. *Upsal.* Bergman.[7]

[1] Mém. de l'Acad. Sav. Etrang. V. 103.
[2] N. Comm. Petrop. X. 367.
[3] This is in Phil. Trans. but not in Nova Acta Sci. Upsal.
[4] Mém. de l'Acad. Sav. Etrang. VI. 253.
[5] Hamb. Mag. XXIV. 157.
[6] This is in Phil. Trans. but not in Nova Acta Sci. Upsal.
[7] This is in Nova Acta Sci. Upsal, but not in Phil. Trans.

Dec. 9. *Upsal.* Bergman.
" 10. *Upsal.* Bergman.
" 11. *Upsal.* Bergman. *St. Petersburg.* Braun.
" 12. *Upsal.* Bergman.
" 13. *Upsal.* Bergman.
" 14. *Upsal.* Bergman. *St. Petersburg.* Braun.
" 15. *Upsal.* Bergman.
" 16. *Upsal.* Bergman.
" 17. *Upsal.* Bergman.
" 19. *Upsal.* Bergman.
" 21. *Upsal.* Bergman.
" 25. *Upsal.* Bergman. *St. Petersburg.* Braun.

1760.

Jan. 10. *Upsal.* Bergman.
" 12. *Upsal.* Bergman.
" 13. *Upsal.* Bergman.
" 17. *Stockholm.* Bergman. *St. Petersburg.* Braun.
" 18. *Stockholm.* Bergman.
" 23. *Stockholm.* Bergman.
Feb. 8. *Stockholm.* Bergman.
" 11. *Stockholm.* Bergman.
" 12. *Stockholm.* Bergman.
" 14. *Upsal.* Bergman.
" 18. *Upsal.* Bergman.
" 19. *Upsal.* Bergman.
" 20. *Upsal.* Bergman.
" 21. *Upsal.* Bergman.
" 22. *Upsal.* Bergman.
Mar. 5. *Upsal.* Bergman.
" 6. *Upsal.* Bergman.
" 12. *Upsal.* Bergman.
" 14. *Cambridge.* Winthrop. Lovering.
" 16. *Upsal.* Bergman.
" 28. *Upsal.* Bergman.
Apr. 2. *St. Petersburg.* Braun.
" 3. *Upsal.* Bergman.
" 6. *Upsal?* Bergman.
" 8. *St. Petersburg.* Braun. *Upsal?* Bergman.
" 9. *St. Petersburg.* Braun.
" 10. *Upsal.* Bergman.
" 11. *Upsal.* Bergman.
" 12. *St. Petersburg.* Braun.
" 14. *Upsal.* Bergman.
" 16. *Upsal?* Bergman.
" 18. *St. Petersburg.* Braun.
" 23. *St. Petersburg.* Braun.
May 3. *Cambridge.* Winthrop. Lovering.
July 20. *Between Upsal and Arbogam.* Bergman.
Aug. 14. *St. Petersburg.* Braun.

Aug. 20. *Upsal.* Bergman.
" 21. *Upsal.* Bergman.
" 22. *Upsal.* Bergman.
" 23. *St. Petersburg.* Braun.
Sept. 10. *Cambridge.* Winthrop. Lovering.
Oct. 2. *Upsal.* Bergman.
" 4. *Cambridge.* Winthrop. Lovering.
" 4. *Upsal.* Bergman.
" 7. *Upsal?* Bergman.
" 8. *Upsal.* Bergman.
" 9. *Upsal.* Bergman.
" 16. *Upsal.* Bergman.
" 25. *Cambridge.* Winthrop. Lovering.
" 30. *Upsal.* Bergman.
" 31. *Upsal.* Bergman.
Nov. 1. *St. Petersburg.* Braun.
" 1. *Hernosand.* Gisler. Boué.
" 1. *Upsal.* Bergman. Thompson.
" 2? *Upsal.* Bergman.
" 6. *Upsal.* Bergman. Thompson.
" 6. *Hernosand.* Gisler. Boué.
" 8. *Upsal.* Bergman. Thompson.
" 8. *Hernosand.* Gisler. Boué.
" 12. *Cambridge.* Winthrop. Lovering.
" 15? *Upsal.* Bergman.
" 23. *Upsal.* Bergman.
" 25. *Upsal.* Bergman.
Dec. 1. *Upsal.* Bergman.
" 5. *Upsal.* Bergman.
" 25. *Upsal.* Bergman.
" 28. *Upsal.* Bergman.

1761.

Jan. 9. *Upsal.* Bergman.
" 10? *Upsal.* Bergman.
" 11. *Upsal.* Bergman.
" 12? *Upsal.* Bergman.
" 17. *Upsal.* Bergman.
" 25. *Upsal.* Bergman. Thompson.
" 25. *Hernosand.* Gisler. Boué.
" 27. *Upsal.* Bergman.
" 29. *Upsal.* Bergman.
" 30. *Upsal.* Bergman.
Feb. 3. *Upsal.* Bergman.
" 13. *Upsal.* Bergman.
" 14. *Upsal.* Bergman.
" 21. *Upsal.* Bergman.
" 21. *Hernosand.* Gisler. Boué.
" 21. *Vienna.* Hell. Boué. Thompson.
" 22. *Upsal.* Bergman.
Feb. 23? *Upsal.* Bergman.
" 24. *Upsal.* Bergman.
" 25? *Upsal.* Bergman.
" 26. *Upsal.* Bergman. *St. Petersburg.* Braun.[1]
" 27. *Hernosand.* Gisler. Boué. Thompson.
" 27. *Upsal.* Bergman. *St. Petersburg.* Braun.
" 28. *Hungary.* Weiss. Reuss.[2]
" 28. *Upsal.* Bergman. *St. Petersburg.* Braun.
Mar. 1. *Upsal.* Bergman.
" 5. *Upsal.* Bergman.
" 10. *Cambridge.* Winthrop. Lovering.
" 11. *Cambridge.* Winthrop. Lovering.
" 15. *Upsal.* Bergman.
" 26. *Upsal.* Bergman.
Apr. 3. *Upsal.* Bergman.
" 4. *Upsal.* Bergman.
" 5. *Upsal.* Bergman.
" 6. *Upsal.* Bergman.
" 7. *Upsal.* Bergman.
" 8. *Upsal.* Bergman.
" 12. *Upsal.* Bergman.
" 13. *Upsal.* Bergman.
May 2. *Upsal.* Bergman.
Aug. 1. *Greenland.* Crantz.[3] Force.
" 11. *Marienstadt.* Bergman.
" 21. *Greenland.* Crantz. Force.
" 27. *Marienstadt.* Bergman.
" 29. *St. Petersburg.* Braun.
" 30. *Marienstadt.* Bergman.
Sept. 9. *St. Petersburg.* Braun.
" 10. *St. Petersburg.* Braun.
" 24. *Marienstadt.* Bergman.
" 25. *Hernosand.* Gisler. Boué.
" 25. *St. Petersburg.* Braun.
" 25. *Marienstadt.* Bergman.
" 25. *Hernosand.* Gisler. Boué and Thompson.
" 26. *Cambridge.* Winthrop. Lovering.
" 26. *Marienstadt.* Bergman.
" 26. *St. Petersburg.* Braun.
" 27. *Marienstadt.* Bergman.
" 28. *Marienstadt.* Bergman.
Oct. 22. *Marienstadt.* Bergman.
" 22. *St. Petersburg.* Braun.
" 23. *Marienstadt.* Bergman.
" 31. *St. Petersburg.* Braun.
Nov. 6. *Cambridge.* Winthrop. Lovering.

[1] N. Comm. Petrop. XI. 320.
[2] Mém. de l'Acad. 1761, p. 25.
[3] Hist. of Greenland. Also, Record of Auroral Phenomena, by P. Force. Smith. Contrib. VIII. 22, I. 48.

Nov. 17. *Upsal.* Bergman.
" 19. *Cambridge.* Winthrop. Lovering.
" 19. *Upsal.* Bergman.
" 29. *Upsal.* Bergman.
" 30. *Upsal.* Bergman.
Dec. 13. *Upsal.* Bergman.
" 21. *St. Petersburg.* Braun.

1762.

Jan. 1. *St. Petersburg.* Braun.
" 23. *St. Petersburg.* Braun.
Feb. 4. *Cambridge.* Winthrop. Lovering.
" 28. *Tyrnau.* Weiss. Boué.[1]
Mar. 14. *St. Petersburg.* Braun.
" 15. *St. Petersburg.* Braun. *Upsal.*[2] Bergman.
" 16. *St. Petersburg.* Braun.
Apr. 10. *St. Petersburg.* Braun.
" 11. *St. Petersburg.* Braun.
" 18. *St. Petersburg.* Braun.
" 27. *St. Petersburg.* Braun.
May 2. *St. Petersburg.* Braun.
" 21. *Cambridge.* Winthrop. Lovering.
" 21. *Paris.* Messier. Reuss and Boué.[3]
" 22. *Paris.* Messier. Reuss and Boué.
Aug. 10. *Cambridge.* Winthrop. Lovering.
" 11. *Cambridge.* Winthrop. Lovering.
" 12. *St. Petersburg.* Braun.
" 13. *Cambridge.* Winthrop. Lovering.
" 13. *St. Petersburg.* Braun.
" 31. *St. Petersburg.* Braun.
Sept. 15. *Cambridge.* Winthrop. Lovering.
" 15. *St. Petersburg.* Braun.
" 16. *St. Petersburg.* Braun.
" 25. *St. Petersburg.* Braun.
Oct. 14. *St. Petersburg.* Braun.
" 19. *St. Petersburg.* Braun.
Nov. 8. *Upsal.* Bergman.
" 16. *St. Petersburg.* Braun. *Upsal.* Bergman.
" 19. *St. Petersburg.* Braun.
" 22. *Upsal.* Bergman.
" 23. *St. Petersburg.* Braun. *Upsal.* Bergman.
Dec. 6. *Upsal.* Bergman.
" 7. *Upsal.* Bergman.
" 13. *Upsal.* Bergman.
" 15. *Upsal.* Bergman. *St. Petersburg.* Braun.
" 17. *St. Petersburg.* Braun.

[1] Mém. de l'Acad. 1761, p. 25.
[2] No observations were made at Upsal this year in January or February.
[3] Mém. de l'Acad. Sav. Etrang. VI. 110.

Dec. 18. *Cambridge.* Winthrop. Lovering.
" 18. *Upsal.* Bergman.
" 19. *St. Petersburg.* Braun.
" 20. *Upsal.* Bergman.
" 21. *Upsal.* Bergman.
" 25. *St. Petersburg.* Braun.

1763.

Mar. 16. *Franeker.* Van Swinden.[1]
Apr. 16. *St. Petersburg.* Braun.[2]
" 17. *St. Petersburg.* Braun.
" 21. *St. Petersburg.* Braun.
" 24. *Cambridge.* Winthrop. Lovering.
May 1. *St. Petersburg.* Braun.
" 2. *Cambridge.* Winthrop. Lovering.
July 31. *Cambridge.* Winthrop. Lovering.
Aug. 4. *Cambridge.* Winthrop. Lovering.
" 21. *St. Petersburg.* Braun.
Sept. 14. *Cambridge.* Winthrop. Lovering.
Oct. 17. *St. Petersburg.* Braun.
" 17. *Upsal.* Mallet. Reuss and Boué.[3]
" 24. *Upsal.* Bergman. Boué and Thompson.
Nov. 11. *Cambridge.* Winthrop. Lovering.
" 11. *Newport, R. I.* Stiles. Loomis.[4]
" 27. *St. Petersburg.* Braun.

1764.

Jan. 8. *St. Petersburg.* Braun.
" 23. *Newport, R. I.* Stiles. Loomis.
Feb. 10. *St. Petersburg.* Braun.
" 16. *Cambridge.* Winthrop. Lovering.
" 21. *Upsal.* Bergman. Boué.
" 22. *St. Petersburg.* Braun. Thompson.
" 26. *St. Petersburg.* Braun.
" 28. *St. Petersburg.* Braun.
Mar. 4. *St. Petersburg.* Braun.
" 5. *Cambridge.* Winthrop. Lovering.
" 5. *Newport, R. I.* Stiles. Loomis.
" 5. *St. Petersburg.* Braun.
Apr. 1. *St. Petersburg.* Braun.
" 23. *Oxford.* Swinton.[5]
May 16. *Cambridge.* Winthrop. Lovering.
June 3. *Cambridge.* Winthrop. Lovering.
" 18. *Cambridge.* Winthrop. Lovering.
" 18. *Newport, R. I.* Stiles. Loomis.

[1] Kamtz. Met. III. 467.
[2] N. Comm. Petrop. XI. 391.
[3] Svenska Vetensk. Acad. XXV. 62.
[4] Trans. Conn. Acad. Sci. I. 155.
[5] Phil. Trans. LIV. 332.

June 19. *Cambridge.* Winthrop. Lovering.
July 27. *Cambridge.* Winthrop. Lovering.
Aug. 19. *St. Petersburg.* Braun.
" 25. *Cambridge.* Winthrop. Lovering.
Sept. 6. *St. Petersburg.* Braun.
Oct. 20. *Cambridge.* Winthrop. Lovering.
" 28. *Cambridge.* Winthrop. Lovering.
" 28. *Newport, R. I.* Stiles. Loomis.
" 29. *Cambridge.* Winthrop. Lovering.
Nov. 25. *St. Petersburg.* Braun.
Dec. 29. *St. Petersburg.* Braun.

1765.

Jan. 22. *St. Petersburg.* Braun.[1]
Feb. 19. *Cambridge.* Winthrop. Lovering.
" 23. *St. Petersburg.* Braun.
Mar. 13. *St. Petersburg.* Braun.
" 14. *St. Petersburg.* Braun.
" 21. *St. Petersburg.* Braun.
" 23. *St. Petersburg.* Braun.
Apr. 29. *St. Petersburg.* Braun.
July 21. *Cambridge.* Winthrop. Lovering.
" 22. *Cambridge.* Winthrop. Lovering.
Aug. 17. *Cambridge.* Winthrop. Lovering.
" 19. *Cambridge.* Winthrop. Lovering.
" 21. *Cambridge.* Winthrop. Lovering.
Sept. 20. *St. Petersburg.* Braun.
Oct. 12. *Cambridge.* Winthrop. Lovering.
Nov. *x.* Thompson.[2]
Dec. 13. *Christiania.* Hansteen.[3]

1766.

Oct. 12. *Oxford.* Swinton.[4]

1767.

Feb. 1. *St. Petersburg.* Braun.
" 2. *St. Petersburg.* Braun.
Apr. 10. *St. Petersburg.* Braun.
" 29. *St. Petersburg.* Braun.
May 16. *Newport, R. I.* Stiles. Loomis.
July 18. *Cambridge.* Winthrop. Lovering.
" 28. *Cambridge.* Winthrop. Lovering.
Aug. 18. *Cambridge.* Winthrop. Lovering.
Dec. 13. *Lucca.* Serantoni. Boué.

1768.

Jan. 10. *St. Petersburg.* Braun.
Jan. 18. *St. Petersburg.* Braun.
Feb. 18. *Cambridge.* Winthrop. Lovering.
" 19. *St. Petersburg.* Braun.
July 20. *Cambridge.* Winthrop. Lovering.
" 20. *Newport, R. I.* Stiles. Loomis.
Aug. 6. *Cambridge.* Winthrop. Lovering.
" 6. *Paris.* Messier. Reuss.[1] *Salem.* Felt.
" 6. *Newport, R. I.* Stiles. Loomis.
" 7. *Newport, R. I.* Stiles. Loomis.
Sept. 14. *Cambridge.* Winthrop. Lovering.
Oct. 2. *Cambridge.* Winthrop. Lovering.
" 26. *Iakutsk.* Islenieff.[2]
" 28. ——— Pilgram.
Nov. 5. *Iakutsk.* Islenieff.
" 14. *Iakutsk.* Isleneiff.
Dec. 5. *Cambridge.* Winthrop. Lovering.
" 5. *Newport, R. I.* Stiles. Loomis.
" 5. *Berlin.* Beguelin.[3] *Paris.* Messier. Reuss.[4]
" 5. *Gottingen.*[5] Boué.
" 6. *Normandy.* Turgot.[6]
" 26. *Iakutsk.* Islenieff.

1769.

Jan. 5. *Cambridge.* Winthrop. Lovering.
" 5. *Lancaster, Penn.*[7]
" 5. *Newport, R. I.* Stiles. Loomis.
" 5. *Montmorenci, France.* Cotte.[8]
Feb. 26. *Oxford.* Swinton.[9] Reuss.
" 27. *Cambridge.* Winthrop. Lovering.
" 27. *Newport, R. I.* Stiles. Loomis.
Mar. 1. *Iakutsk.* Islenieff.
Apr. 20. *Newport, R. I.* Stiles. Loomis.
June 9. *Cambridge.* Winthrop. Lovering.
" 28. *Cambridge.* Winthrop. Lovering.
" 29. *Cambridge.* Winthrop. Lovering.
July 2. *Cambridge.* Winthrop. Lovering.
" 7. *Cambridge.* Winthrop. Lovering.
" 7. *Newport, R. I.* Stiles. Loomis.
" 8. *Cambridge.* Winthrop. Lovering.
" 8. *Newport, R. I.* Stiles. Loomis.
" 19. *Salem.* Holyoke. Felt.[10]

1 Phil. Trans. LIX. 86.
2 N. Acta Petrop. X. 505.
3 Mém. de l'Acad. Berlin, 1769, p. 144.
4 Phil. Trans. LIX. 367.
5 Hannov. Mag. 1768, p. 1654.
6 Mém. de l'Acad. 1768, p. 33.
7 Trans. Amer. Phil. Soc. I. 404.
8 Traité &c. par Cotte, p. 601.
9 Phil. Trans. LIX. 367.
10 Amer. Jour. Sci. XIV. 101.

1 N. Comm. Petrop. XIV. 589.
2 Thompson's Meterology, p. 350.
3 Gilbert. Ann. LXVII. 48.
4 Phil. Trans. LVII. 108.

Aug. 5. *Cambridge.* Winthrop. Lovering.
Sept. 9. *Oxford.* Swinton.[1] Reuss.
" 23. *St. Petersburg.* Euler.[2]
" 26. *Cambridge.* Winthrop. Lovering. Pilgram.
Oct. 7. *Cambridge.* Winthrop. Lovering.
" 7. *Newport, R. I.* Stiles. Loomis.
" 8. *St Petersburg.* Euler.
" 23. *Cambridge.* Winthrop. Lovering.
" 23. *Newport, R. I.* Stiles. Loomis.
" 24. *Berlin.* Beguelin. *Rheims.* Lavoisier. Reuss.[3]
" 24. *Newport, R. I.* Stiles. Loomis.
" 24. *St. Petersburg.* Euler. Pilgram.
" 24. *Havre.* Dicquemare.[4]
" 25. *Cambridge.* Winthrop. Lovering.
" 25. *Newport, R. I.* Stiles. Loomis.
" 25. *Havre.* Dicquemare.
" 26. *Cambridge.* Winthrop. Lovering.
" 26. *St. Petersburg.* Euler. *Havre.* Dicquemare.
" 27. *Havre.* Dicquemare.
" 27. *Cambridge.* Winthrop. Lovering.
" 27. *St. Petersburg.* Euler.
" *x. Beziers.* Bertholon.[5]
" *x. Beziers.* Bertholon.
Nov. 1. *St. Petersburg.* Euler.
" 3. *Berlin.* Beguelin.
" 17. *St. Petersburg.* Euler.
" 23. *St. Petersburg.* Euler.
Dec. 2. *St. Petersburg.* Euler.
" 4. *St. Petersburg.* Euler.
" 6. *Cambridge.* Winthrop. Lovering.

1770.

Jan. 17. *Cambridge.* Winthrop. Lovering.
" 17. *Newport, R. I.* Stiles. Loomis.
" 17. *Berlin.* Beguelin.[6]
" 18. *Cambridge.* Winthrop. Lovering.
" 18. *Berlin.* Beguelin. *Christiania.* Hansteen.[7]
" 18. *Newport, R. I.* Stiles. Loomis.
" 18. *Jena.* Zeissing.[8] *Beziers.* Bertholon.
" 18. *Cadiz, Rome, Vienna, &c.* Pilgram.
" 18. *Spain.* Nifo. Rico.[9]

[1] Phil. Trans. LIX. 369.
[2] N. Comm. Petrop. XIV. 636.
[3] Journ. de Phys. IX. 279. Mém. de l'Acad. 1769, p. 22. Also Mém. de l'Acad. Berlin, 1769, p. 163.
[4] Journ. de Phys. IX. 279.
[5] Encyc. Method. I. 365.
[6] Mém. de l'Acad. Berlin, 1770, p. 93.
[7] Gilbert. Ann. LXVII. 48.
[8] Gilbert. Ann. XV. 208.
[9] Mem. Acad. Cienc. Madrid, III. 77.

Feb. 1. *Berlin.* Beguelin.
" 12. *Berlin.* Beguelin.
" 13. *St. Petersburg.* Euler.[1]
" 15. *Berlin.* Beguelin.
" 18. *Berlin.* Beguelin.
" 25. *St. Petersburg.* Euler. *Berlin.* Beguelin.
" 27. *St. Petersburg.* Euler.
" 28. *Cambridge.* Winthrop. Lovering.
" 28. *Newport, R. I.* Stiles. Loomis.
" 28. *St. Petersburg.* Euler.
Mar. 2. *St. Petersburg.* Euler.
" 14. *Berlin.* Beguelin.
" 18. *Berlin.* Beguelin.
" 23. *Cambridge.* Winthrop. Lovering.
" 23. *Newport, R. I.* Stiles. Loomis.
" 23. *St. Petersburg.* Euler. *Berlin.* Beguelin.
" 26. *Berlin.* Beguelin.
" 27. *St. Petersburg.* Euler. *Berlin.* Beguelin.
" 29. *Jena.* Zeissing.
Apr. 12. *St. Petersburg.* Euler.
" 13. *St. Petersburg.* Euler. *Berlin.* Beguelin.
" 14. *Berlin.* Beguelin.
" 15. *St. Petersburg.* Euler.
" 17. *Berlin.* Beguelin.
" 19. *Cambridge.* Winthrop. Lovering.
" 19. *Berlin.* Beguelin.
" 20. *Berlin.* Beguelin.
May 16. *Cambridge.* Winthrop. Lovering.
" 27. *Berlin.* Beguelin.
July 14. *Cambridge.* Winthrop. Lovering.
" 16. *Cambridge.* Winthrop. Lovering.
" 27. *Cambridge.* Winthrop. Lovering.
" 31. *Cambridge.* Winthrop. Lovering.
Aug. 1. *Lübeck.* Behn. Boué.[2]
" 8. *Jena.* Zeissing.
" 10. *Jena.* Zeissing.
" 27. *Cambridge.* Winthrop. Lovering.
" 31. *Cambridge.* Winthrop. Lovering.
" 31. *Jena.* Zeissing. *Beziers.* Bertholon.
" 31. *Gottingen.* Boué.[3]
Sept. 9. *Cambridge.* Winthrop. Lovering.
" 9. *Berlin.* Beguelin.
" 16. *Cambridge.* Winthrop. Lovering.
" 17. *Montmorenci.* Cotte.
" 17. *Pekin.* Amiot.[4] *Lübeck.* Behn. Boué.
Oct. 26. *St. Petersburg.* Euler.

[1] N. Comm. Petrop. XV. 682.
[2] Sitz. Bericht. Wien. XLV. 442.
[3] Hannov. Mag. 1770, p. 1217.
[4] Kamtz. Lehrbuch der Met. III. 465.

Nov. 8. *Lübeck.* Behn. Boué.[1]
" 24. *St. Petersburg.* Euler.
" 26. *Lübeck.* Behn. *St. Petersburg.* Euler.
Dec. 17. *Jena.* Zeissing.
" 24. *Jena.* Zeissing.

1771.

Jan. 6. *Berlin.* Beguelin.
" 15. *Berlin.* Beguelin.
" 18. *Berlin.* Beguelin.
" 20. *Berlin.* Beguelin.
" 26. *St. Petersburg.* Euler.[2]
Feb. 7. *St. Petersburg.* Euler.
" 8. *St. Petersburg.* Euler.
" 9. *Berlin.* Beguelin.
" 10. *Berlin.* Beguelin.
" 15. *Berlin.* Beguelin.
" 19. *Cambridge.* Winthrop. Lovering.
" 19. *Berlin.* Beguelin. *St. Petersburg.* Euler.
" 19. *Montmorenci. Paris. Franeker.* Cotte.[3]
" 20. *Montmorenci.* Cotte.
Mar. 2. *St. Petersburg.* Euler.
" 13. *St. Petersburg.* Euler. Berlin. Beguelin.
" 13. *Montmorenci. Franeker.* Cotte.
" 14. *St. Petersburg.* Euler.
" 15. *St. Petersburg.* Euler.
" 16. *St. Petersburg.* Euler.
" 17. Cambridge. Winthrop. Lovering.
" 17. St. Petersburg. Euler.
" 18. Cambridge. Winthrop. Lovering.
" 23. *St. Petersburg.* Euler.
" 30. *Paris.* Boué.
Apr. 2. *St. Petersburg.* Euler.
" 4. *Berlin.* Beguelin.
" 5. *Berlin.* Beguelin. *Montmorenci.* Cotte.
" 15. *Berlin.* Beguelin. *Montmorenci.* Cotte.
May 2. *Berlin.* Beguelin.
" 3. *Berlin.* Beguelin.
" 6? *Berlin.* Beguelin.
" 7. *Berlin.* Beguelin.
" 8. *Berlin.* Beguelin.
" 12. *St. Petersburg.* Euler.
" 12. *Franeker.* Cotte. *Jena.* Zeissing.
" 13. *St. Petersburg.* Euler. *Franeker.* Cotte.
June 2. *Cambridge.* Winthrop. Lovering.
" 2. *Lübeck.* Behn. Boué.

[1] In the Chateau de Saintes en Hainaut, three auroras were observed in 1770. Mém. de l'Acad. Brux. I. 554.
[2] N. Comm. Petrop. XVI. 695.
[3] Mém. de Met. I.

June 12. *Cambridge.* Winthrop. Lovering.
July 2. *St. Petersburg.* Euler.
" 12. *Berlin.* Beguelin.
Aug. 3. *Berlin.* Beguelin.
" 12. *St. Petersburg.* Euler.
" 16. *Cambridge.* Winthrop. Lovering.
" 17. *Cambridge.* Winthrop. Lovering.
" 30. *Franeker.* Cotte.
Sept. 6. *St. Petersburg.* Euler.
" 11. *St. Petersburg.* Euler.
" 13. *Cambridge.* Winthrop. Lovering.
" 17. *Cambridge.* Winthrop. Lovering.
" 20. *St. Petersburg.* Euler.
" 29. *St. Petersburg.* Euler.
Oct. 4. *Cambridge.* Winthrop. Lovering.
" 4. *Franeker.* Cotte.
" 5. *Berlin.* Beguelin.
" 6. *St. Petersburg.* Euler. *Berlin.* Beguelin.
" 8. *St. Petersburg.* Euler.
" 9. *Berlin.* Beguelin. *Franeker.* Cotte.
" 18. *Cambridge.* Winthrop. Lovering.
" 28. *St. Petersburg.* Euler.
" 31. *St. Petersburg.* Euler.
Nov. 1. *Cambridge.* Winthrop. Lovering.
" 1. *Franeker.* Cotte.
" 2. *St. Petersburg.* Euler.
" 4. *St. Petersburg.* Euler.
" 5. *Cambridge.* Winthrop. Lovering.
" 12. *Cambridge.* Winthrop. Lovering.
" 12. *Berlin.* Beguelin.
" 14. *Franeker.* Cotte.
" 18. *Berlin.* Beguelin.
Dec. 5. *Cambridge.* Winthrop. Lovering.
" 4. *Franeker.* Cotte.
" 31. *St. Petersburg.* Euler.

1772.

Jan. 1. *Berlin.* Beguelin.
" 3. *Berlin.* Beguelin.
" 6. *Bradford, Mass.* Williams.[1]
" 6. *St. Petersburg.* Euler.
" 7. *St. Petersburg.* Euler.
" 17. *St. Petersburg.* Euler.[2]
Feb. 6. *Bradford, Mass.* Williams.
" 6. *Berlin.* Beguelin. *Franeker.* Cotte.
" 11. *St. Petersburg.* Euler.
" 18. *Marseilles.* Cotte.
" 21. *St. Petersburg.* Euler.

[1] Amer. Phil. Soc. II. 118.
[2] N. Comm. Petrop. XVII. 717.

Feb. 27. *Cambridge.* Winthrop. Lovering.
" 27. *Bradford, Mass.* Williams.
Mar. 2. *Franeker.* Cotte.
" 3. *Franeker.* Cotte.
" 5. *Berlin.* Beguelin.
" 6. *Montmorenci.* Cotte.
" 10. *St. Petersburg.* Euler.
" 11. *St. Petersburg.* Euler.
" 13. *St. Petersburg.* Euler.
" 16. *St. Petersburg.* Euler.
" 17. *St. Petersburg.* Euler.
" 19. *St. Petersburg.* Euler.
" 21. *St. Petersburg.* Euler.
" 22. *Berlin.* Beguelin.
" 28. *Berlin.* Beguelin. *Franeker.* Cotte.
" 30. *Berlin.* Beguelin.
Apr. 3. *Berlin.* Beguelen. *Franeker.* Cotte.
" 4. *St. Petersburg.* Euler.
" 12. *Cambridge.* Winthrop. Lovering.
" 12. *Bradford, Mass.* Williams.
" 14. *St. Petersburg.* Euler.
" 15. *St. Petersburg.* Euler.
" 20. *Berlin.* Beguelin.
" 22. *St. Petersburg.* Euler.
" 25. *Berlin.* Beguelin.
" 29. *Franeker.* Cotte.
June 14. *Marseilles.* Cotte.
" 21. *Franeker.* Cotte.
July 5. *Cambridge.* Winthrop. Lovering.
" 5. *Bradford, Mass.* Williams.
" 7. *Cambridge.* Winthrop. Lovering.
" 8. *Cambridge.* Winthrop. Lovering.
" 8. *Bradford, Mass.* Williams.
" 8. *Newport, R. I.* Stiles. Loomis.
" 25. *Cambridge.* Winthrop. Lovering.
" 25. *Bradford, Mass.* Williams.
" 25. *Newport, R. I.* Stiles. Loomis.
Aug. 31. *Berlin.* Beguelin. *Montmorenci.* Cotte.
Sept. 4. *Stockholm.* Wilke.[1]
" 20. *Berlin.* Beguelin.
" 25. *Franeker.* Cotte.
" 27. *Franeker.* Cotte. *Stockholm.* Wilke.
Oct. 2. *Cambridge.* Winthrop. Lovering.
" 2. *Bradford, Mass.* Williams.
" 2. *Montmorenci. Brussels. Franeker.* Cotte.
" 5. *St. Petersburg.* Euler. *Marseilles.* Cotte.
" 6. *Brussels.* Cotte. *St. Petersburg.* Euler.
" 14. *Marseilles.* Cotte.

[1] Gilbert. Ann. XXIX. 420.

Oct. 16. *Franeker.* Cotte.
" 20. *Franeker.* Cotte.
" 23. *Marseilles.* Cotte.
" 27. *Montmorenci and Marseilles.* Cotte.
" 27. *Jena.* Zeissing.
" 27. *Piedmont.* Berando. Pilgram.[1]
" 29. *Franeker.* Cotte.
" 30. *Franeker.* Cotte.
Nov. 7. *St. Petersburg.* Euler.
" 24. *Berlin.* Beguelin.
" 26. *St. Petersburg.* Euler.
" 27. *Berlin.* Beguelin.
Dec. 2. *St. Petersburg.* Euler.
" 14. *Bradford, Mass.* Williams.
" 18. *Berlin.* Beguelin.
" 29. *St. Petersburg.* Euler.

1773.

Jan. 4. *St. Petersburg.* Euler.
" 17. *Cambridge.* Winthrop. Lovering.
" 17. *Newport, R. I.* Stiles. Loomis.
" 17. *Berlin.* Beguelin.
" 18. *Berlin.* Beguelin. *Franeker.* Cotte.
" 18. *Newport, R. I.* Stiles. Loomis.
" 19. *Cambridge.* Winthrop. Lovering.
" 19. *Newport, R. I.* Stiles. Loomis.
" 19. *Berlin.* Beguelin.
" 21. *Berlin.* Beguelin.
" 26. *St. Petersburg.* Euler.
" 27. *St. Petersburg.* Euler.
" 28. *St. Petersburg.* Euler.
" 29. *St. Petersburg.* Euler.
Feb. 7. *St. Petersburg.* Euler.
" 8. *St. Petersburg.* Euler.
" 10. *St. Petersburg.* Euler.
" 12. *St. Petersburg.* Euler.
" 17. *South Latitude?*
" 18. *Franeker.* Van Swinden.
" 18. *Berlin.* Beguelin.[2]
" 20. *Franeker.* Van Swinden.
" 20. *Berlin.* Beguelin.
" 21. *Franeker.* Van Swinden.
" 21. *Berlin.* Beguelin.
" 22. *Berlin.* Beguelin.
Mar. 4. *St. Petersburg.* Euler.
" 12. *Franeker.* Cotte. *Berlin.* Beguelin.
" 13. *Franeker.* Cotte.

[1] Encyc. Method. I. 348. Journ. de Sav. 1773, p. 188.
[2] Kamtz. Lehrbuch der Met. III. 465.

Mar. 14. *Berlin.* Beguelin.
" 15. *Cambridge.* Winthrop. Lovering.
" 16. *Franeker.* Van Swinden.
" 21. *Berlin.* Beguelin.
" 23. *Cambridge.* Winthrop. Lovering.
" 23. *St. Petersburg.* Euler. *Franeker.* Cotte.
" 24. *St. Petersburg.* Euler.
" 26. *Berlin.* Beguelin. *Lübeck.* Behn. Boué.
" 26. *Montmorenci and Franeker.* Cotte.
" 27. *St. Petersburg.* Euler.
April 1. *St. Petersburg.* Euler.
" 17. *Franeker.* Cotte.
" 20. *Brussels.* Cotte.
" 23. *St. Petersburg.* Euler.
" 27. *Franeker.* Cotte.
" 29. *St. Petersburg.* Euler.
May 4. *St. Petersburg.* Euler.
" 5. *St. Petersburg.* Euler.
" 8. *St. Petersburg.* Euler.
" 11. *Marseilles.* Cotte.
" 13. *Berlin.* Beguelin.
" 17. *Berlin.* Beguelin.
" 18. *Berlin.* Beguelin.
" 19. *Cambridge.* Winthrop. Lovering.
" 19. *Berlin.* Beguelin.
" 23. *Lübeck.* Behn. Boué.
" 24. *Marseilles.* Cotte.
" 26. *Marseilles.* Cotte.
June 6. *Cambridge.* Winthrop. Lovering.
" 6. *Newport, R. I.* Stiles. Loomis.
" 10. *Cambridge.* Winthrop. Lovering.
" 13. *Cambridge.* Winthrop. Lovering.
" 14. *Cambridge.* Winthrop. Lovering.
" 17. *Cambridge.* Winthrop. Lovering.
" 24. *Cambridge.* Winthrop. Lovering.
" 24. *Franeker.* Cotte.
July 12. *Cambridge.* Winthrop. Lovering.
" 17. *Cambridge.* Winthrop. Lovering.
" 17. *Newport, R. I.* Stiles. Loomis.
" 17. *Bradford, Mass.* Williams.[1] *Spain.* Rico.
" 17. *Franeker.* Cotte. Reuss.[2] *Paris.* Wallot.
" 18. *Cambridge.* Winthrop. Lovering.
" 25. *Cambridge.* Winthrop. Lovering.
" 25 .*Francker.* Cotte.
Aug. 15. *Cambridge.* Winthrop. Lovering.
" 15. *Breslau.* Reuss.[3]
" 16. *Breslau.* Reuss.

[1] Amer. Phil. Trans. II. 136.
[2] Mém. de l'Acad. 1773, p. 6.
[3] Repert. Comment. IV. 131.

Aug. 25. *Cambridge.* Winthrop. Lovering.
" 26. *St. Petersburg.* Euler.
Sept. 1. *Marseilles.* Cotte.
" 11. *Montmorenci and Franeker.* Cotte.
" 12 *Franeker.* Cotte.
" 15. *Berlin.* Beguelin.
" 17. *Paris.* Cotte. *Pekin.* Amyot. Boué.
" 21. *St. Petersburg.* Euler.
" 22. *Marseilles.* Cotte.
" 24. *Marseilles.* Cotte.
" 27. *Franeker.* Cotte.
Oct. 7. *Franeker.* Cotte.
" 8. *St. Petersburg.* Euler.
" 12. *Franeker.* Cotte.
" 16. *Stockholm.* Wilke.
" 19. *Franeker and Brussels.* Cotte.
" 20. *St. Petersburg.* Euler.
" 20. *Montmorenci, Franeker, and Brussels.* Cotte.
" 21. *Franeker.* Cotte.
" 27. *Franeker.* Cotte.
" 28. *Franeker.* Cotte.
" 29. *Marseilles.* Cotte.
" 31. *St. Petersburg.* Euler.
Nov. 1. *St. Petersburg.* Euler.
" 7. *Berlin.* Beguelin.
" 8. *Berlin.* Beguelin.
" 15. *Berlin.* Beguelin.
" 17. *Franeker.* Cotte.
" 25. *St. Petersburg.* Euler.
" 26. *St. Petersburg.* Euler.
" 27. *St. Petersburg.* Euler.
" 28. *St. Petersburg.* Euler.
" 29. *St. Petersburg.* Euler.
Dec. 13. *Franeker.* Cotte.
" 14. *St. Petersburg.* Euler.
" 15. *Franeker and Marseilles.* Cotte.
" 25. *St. Petersburg.* Euler.

1774.

Jan. 9. *Newport, R. I.* Stiles. Loomis.
" 10. *Franeker.* Cotte.
" 11. *Franeker.* Cotte.
" 21. *St. Petersburg.* Euler.[1]
" 22. *St. Petersburg.* Euler.
Feb. 14. *St. Petersburg.* Euler.
" 28. *Cambridge.* Winthrop. Lovering.
Mar. 2. *Franeker.* Cotte. *Berlin.* Beguelin.
" 3. *Newport, R. I.* Stiles. Loomis.
" 3. *Franeker, Montmorenci, and Brussels.* Cotte.

[1] N. Comm. Petrop. XIX. 653.

Mar. 3. *Berlin.* Beguelin.
" 13. *Cambridge.* Winthrop. Lovering.
" 13. *Newport, R. I.* Stiles. Loomis.
" 13. *Franeker.* Cotte. *Berlin.* Beguelen.
" 14. *Franeker, Montmorenci and Brussels.* Cotte.
" 15. *Newport, R. I.* Stiles. Loomis.
" 15. *Franeker and Montmorenci.* Cotte.
" 17. *Berlin.* Beguelin. *Franeker.* Cotte.
" 18. *Franeker.* Cotte.
" 20. *St. Petersburg.* Euler. *Franeker.* Cotte.
" 25. *St. Petersburg.* Euler. *Stockholm.* Wilke.
" 26. *Franeker.* Cotte.
" 27. *St. Petersburg.* Euler.
" 30. *Berlin.* Beguelin.
" 31. *Berlin.* Beguelin. *Franeker.* Cotte.
" 31. *St. Petersburg.* Euler.
April 1. *Berlin.* Beguelin. *St. Petersburg.* Euler.
" 3. *Cambridge.* Winthrop. Lovering.
" 4. *Berlin.* Beguelin. *Franeker.* Cotte.
" 6. *Berlin.* Beguelin.
" 7. *St. Petersburg.* Euler. *Berlin.* Beguelin.
" 10. *St. Petersburg.* Euler.
" 11. *St. Petersburg.* Euler.
" 12. *St. Petersburg.* Euler.
" 13. *St. Petersburg.* Euler.
" 14. *St. Petersburg.* Euler.
" 15. *St. Petersburg.* Euler.
" 16. *St. Petersburg.* Euler.
" 18. *St. Petersburg.* Euler.
" 23. *Brussels.* Cotte.
" 24. *St. Petersburg.* Euler.
May 1. *Marseilles.* Cotte.
" 2. *Marseilles.* Cotte.
" 3. *Franeker and Brussels.* Cotte.
" 4. *St. Petersburg.* Euler.
" 5. *Franeker and Marseilles.* Cotte.
" 9. *Stockholm.* Wilke.
" 10. *Franeker.* Cotte.
" 12. *St. Petersburg.* Euler.
" 13. *St. Petersburg.* Euler.
" 14. *Cologne.* Bildersael. Pilgram.
" 16. *Brussels.* Cotte.
" 18. *St. Petersburg.* Euler.
" 23. *Franeker.* Cotte.
" 30. *Franeker.* Cotte.
June 4. *Cambridge.* Winthrop. Lovering.
" 6. *Lübeck.* Behn. Boué.
" 7. *Lübeck.* Behn. Boué.
" 12. *Lübeck.* Behn. Boué.
June 13. *Marseilles.* Cotte.
" 15. *Lübeck.* Behn. Boué.
July 9. *Cambridge.* Winthrop. Lovering.
" 10. *Marseilles.* Cotte.
" 12. *Cambridge.* Winthrop. Lovering.
" 13. *Cambridge.* Winthrop. Lovering.
" 13. *Franeker.* Van Swinden.
" 24. *Franeker.* Van Swinden. Cotte.[1]
" 25. *Franeker.* Van Swinden. Cotte.
" 28. *Cambridge.* Winthrop. Lovering.
" 29. *Cambridge.* Winthrop. Lovering.
Aug. 2. *Franeker.* Cotte.
" 3. *Franeker.* Cotte.
" 14. *Cambridge.* Winthrop. Lovering.
" 21. *Franeker.* Cotte. *Lübeck.* Behn. Boué.
" 22. *Franeker and Marseilles.*
" 23. *St. Petersburg.* Euler.
" 24. *Marseilles.* Cotte. *St. Petersburg.* Euler.
" 26. *Cambridge.* Winthrop. Lovering.
" 27. *Marseilles.* Cotte.
" 28. *Marseilles.* Cotte.
" 29. *Franeker.* Cotte.
Sept. 1. *Cambridge.* Winthrop. Lovering.
" 1. *St. Petersburg.* Euler.
" 3. *Franeker.* Cotte.
" 9. *St. Petersburg.* Euler.
" 10. *Cambridge.* Winthrop. Lovering.
" 19. *Franeker.* Cotte.
" 21. *St. Petersburg.* Euler.
" 22. *St. Petersburg.* Euler.
" 24. *St. Petersburg.* Euler.
" 25. *Marseilles.* Cotte.
" 26. *Marseilles.* Cotte.
" 29. *St. Petersburg.* Euler.
" 30. *Marseilles.* Cotte.
Oct. 1. *Berlin.* Beguelin.
" 5. *St. Petersburg.* Euler.
" 6. *St. Petersburg.* Euler.
" 8. *St. Petersburg.* Euler.
" 8. *Newport, R. I.* Stiles. Loomis.
" 11. *St. Petersburg.* Euler.
" 12. *Berlin.* Beguelin.
" 13. *St. Petersburg.* Euler.
" 19. *St. Petersburg.* Euler.
" 21. *Franeker.* Cotte.
" 25. *St. Petersburg.* Euler.
" 28. *Franeker.* Cotte.
" 29. *St. Petersburg.* Euler. *Franeker.* Cotte.

[1] Mém. de l'Acad. Sav. Etrang. Paris. VIII. 394.

Oct. 20. *St. Petersburg.* Euler.[1]
" 28. *St. Petersburg.* Euler.
Nov. 3. *Cambridge.* Winthrop. Lovering.
" 3. *Franeker.* Cotte. *St. Petersburg.* Euler.
" 5. *Cambridge.* Winthrop. Lovering.
" 5. *Franeker.* Cotte. *St. Petersburg.* Euler.
" 7. *St. Petersburg.* Euler.
" 11. *Franeker.* Cotte.
" 24. *St. Petersburg.* Euler.
" 26. *St. Petersburg.* Euler.
Dec. 1. *Franeker.* Cotte. *St. Petersburg.* Euler.
" 1. *Newport, R. I.* Stiles. Loomis.
" 4. *Marseilles.* Cotte.
" 26. *St. Petersburg.* Euler.
" 28. *St. Petersburg.* Euler.

1775.

Jan. 1. *St. Petersburg.* Euler.[2]
" 6. *Franeker.* Cotte.
" 20. *Montmorenci and Franeker.* Cotte.
" 21. *Montmorenci and Franeker.* Cotte.
" 21. *St. Petersburg.* Euler.
" 22. *St. Petersburg.* Euler.
" 23. *Franeker.* Cotte. *St. Petersburg.* Euler.
" 24. *Franeker.* Cotte.
" 25. *Franeker.* Cotte. *St. Petersburg.* Euler.
" 26. *St. Petersburg.* Euler.
" 27. *St. Petersburg.* Euler.
" 28. *Montmorenci and Franeker.* Cotte.
" 29. *Cambridge.* Winthrop. Lovering.
" 29. *Newport, R. I.* Stiles. Loomis.
" 29. *St. Petersburg.* Euler.
" 30. *Franeker.* Cotte.
Feb. 1. *Brussels.* Cotte.
" 2. *Cambridge.* Winthrop. Lovering.
" 4. *Brussels.* Cotte.
" 19. *Franeker.* Cotte. *St. Petersburg.* Euler.
" 20. *Bordeaux.* Cotte. *St. Petersburg.* Euler.
" 21. *Cambridge.* Winthrop. Lovering.
" 21. *Franeker.* Cotte. *St. Petersburg.* Euler.
" 23. *St. Petersburg.* Euler.
" 28. *Franeker.* Cotte.
Mar. 19. *Franeker.* Cotte.
" 20. *Franeker.* Cotte.

[1] All the St. Petersburg observations from Jan. 17, 1772 to the bottom of page 64 should be corrected by subtracting 11 days from their respective dates: the error having originated in reducing to new style dates already corrected.

[2] N. Comm. Petrop. XX. 643.

Mar. 21. *Franeker.* Cotte.
" 22. *St. Petersburg.* Euler.
" 24. *St. Petersburg.* Euler.
" 25. *Cambridge.* Winthrop. Lovering.
" 26. *Franeker.* Cotte.
" 27. *Franeker.* Cotte.
" 28. *Franeker.* Cotte.
" 29. *Franeker.* Cotte.
" 30. *Franeker.* Cotte. *St. Petersburg.* Euler.
Apr. 1. *St. Petersburg.* Euler.
" 2. *St. Petersburg.* Euler.
" 4. *Franeker.* Cotte.
" 13. *Franeker.* Cotte.
" 15. *Franeker.* Cotte.
" 17. *Franeker.* Cotte.
" 18. *Franeker.* Cotte.
" 19. *Franeker.* Cotte.
" 20. *Franeker.* Cotte.
" 23. *St. Petersburg.* Euler.
May 2. *Franeker.* Cotte.
" 15. *Franeker.* Cotte.
" 20. *Franeker.* Cotte.
July 18. *Cambridge.* Winthrop. Lovering.
" 20. *Franeker.* Cotte.
" 21. *Franeker.* Cotte.
Aug. 24. *St. Petersburg.* Euler.
" 27. *St. Petersburg.* Euler.
Sept. 15. *Franeker.* Cotte.
" 16. *Franeker.* Cotte.
" 17. *Montmorenci and Franeker.* Cotte.
" 19. *Vire. Normandy.* Cotte.
" 22. *Franeker.* Cotte.
" 23. *Franeker.* Cotte.
" 24. *St. Petersburg.* Euler.
" 27. *Franeker.* Cotte. *St. Petersburg.* Euler.
Oct. 13. *St. Petersburg.* Euler.
" 18. *Brussels.* Cotte.
" 21. *Vienna.* Pilgram.
Nov. 23. *Franeker.* Cotte.
Dec. 15. *Franeker.* Cotte. *Berlin.* Beguelin.

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Jan. 18. *Berlin.* Beguelin.
" 18. *St. Petersburg.* Euler.[1]
" 20. *Franeker.* Cotte.
" 21. *Franeker.* Cotte. *Berlin.* Beguelin.
Feb. 11. *Franeker.* Cotte.

[1] Acta Sci. Acad. Petrop. 1777, Pt. 1, p. 384.

Mar. 9. *St. Petersburg.* Euler.
" 13. *Montmorenci.* Cotte.
" 23. *Franeker.* Cotte.
" 28. *Montmorenci.* Cotte.
" 28. *St. Petersburg.* Euler.
Apr. 8. *Montmorenci, Franeker, and Brussels.* Cotte.
" 10. *Brussels.* Cotte.
" 18. *Cambridge.* Winthrop. Lovering.
" 19. *Franeker.* Cotte.
May 3. *Brussels.* Cotte.
" 21. *Franeker.* Cotte.
" 23. *Brussels.* Cotte.
" 25. *Brussels.* Cotte.
June 6. *Brussels.* Cotte.
" 7. *Brussels.* Cotte.
July 7. *Franeker.* Cotte.
Aug. 14. *Montmorenci and Franeker.* Cotte.
Sept. 3. *St. Petersburg.* Euler.
" 4. *Cambridge.* Winthrop. Lovering.
" 4. *Franeker.* Cotte.
" 5. *Cambridge.* Winthrop. Lovering.
" 5. *Franeker and Montmorenci.* Cotte.
" 5. *Berlin.* Beguelin. *St. Petersburg.* Euler.
" 6. *Franeker.* Cotte.
" 8. *St. Petersburg.* Euler.
" 9. *St. Petersburg.* Euler.
" 12. *Franeker.* Cotte.
" 16. *Cambridge.* Winthrop. Lovering.
" 16. *Montmorenci, Brussels, and Franeker.* Cotte.
" 16. *St. Petersburg.* Euler. *Bordeaux.* Cotte.
" 19. *St. Petersburg.* Euler.
" 22. *Montmorenci and Brussels.* Cotte.
" 23. *Franeker.* Cotte. *St. Petersburg.* Euler.
" 24. *Franeker.* Cotte.
" 25. *Brussels.* Cotte.
Oct. 3. *Franeker.* Cotte.
" 6. *St. Petersburg.* Euler.
" 7. *St. Petersburg.* Euler.
" 27. *Franeker.* Cotte.
Nov. 16. *Franeker.* Cotte. *Berlin.* Beguelin.
Dec. 16. *Franeker.* Cotte.

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Jan. 13. *Montmorenci.* Cotte.
" 28. *Cambridge.* Winthrop. Lovering.
" 28. *Dighton, Mass.* Stiles. Loomis.
" 28. *Franeker and Holland.* Cotte.
" 28. *St. Petersburg.* Euler.[1]

[1] Acta Sci. Acad. Petrop. 1777, Pt. 2, p. 395.

Jan. 30. *Holland.* Cotte.
Feb. 5. *Montmorenci and Franeker.* Cotte.
" 5. *St. Petersburg.* Euler.
" 6. *St. Petersburg.* Euler.
" 6. *Holland.* Cotte.
" 7. *Montmorenci and Holland.* Cotte.
" 10. *St. Petersburg.* Euler.
" 17. *Holland.* Cotte.
" 26. *Berlin.* Beguelin. *Jena.* Zeissing.
" 26. *Paris.* Detienne and Pingré. Reuss.[1]
" 26. *Montmorenci and Franeker.* Cotte.
" 26. *Amsterdam.* Cotte.
" 27. *Montmorenci.* Cotte.
Mar. 1. *Berlin.* Beguelin. *St. Petersburg.* Euler.
" 5. *Dighton, Mass.* Stiles. Loomis.
" 5. *Montmorenci.* Cotte.
" 5. *St. Petersburg.* Euler.
" 6. *Franeker, Brussels, and Holland.* Cotte.
" 9. *St. Petersburg.* Euler.
" 10. *Franeker.* Van Swinden. Cotte.
" 10. *St. Petersburg.* Euler.
" 11. *Franeker.* Van Swinden. Cotte.
" 12. *Franeker and Amsterdam.* Cotte.
" 12. *St. Petersburg.* Euler.
" 14. *St. Petersburg.* Euler.
" 22. *Franeker.* Van Swinden. *Amsterdam.* Cotte.
" 28. *St. Petersburg.* Euler.
" 28. *Berlin.* Beguelin.
" 29. *Cambridge.* Winthrop. Lovering.
" 29. *Franeker and Holland.* Cotte.
" 29. *Berlin.* Beguelen.
" 31. *Holland.* Cotte.
Apr. 1. *Brussels.* Cotte. *St. Petersburg.* Euler.
" 4. *Berlin.* Beguelin. *Franeker.* Van Swinden.
" 4. *Holland and Brussels.* Cotte.
" 4. *St. Petersburg* Euler.
" 5. *Berlin.* Beguelin. *Franeker.* Van Swinden.
" 5. *St. Petersburg.* Euler.
" 5. *Holland and Brussels.* Cotte.
" 6. *Cambridge.* Winthrop. Lovering.
" 6. *Montmorenci.* Cotte. *St. Petersburg.* Euler.
" 7. *Franeker.* Van Swinden.
" 7. *Holland and Brussels.* Cotte.
" 8. *Franeker.* Van Swinden.
" 8. *St. Petersburg.* Euler.
" 8. *Holland and Brussels.* Cotte.
" 9. *Franeker.* Van Swinden. *Berlin.* Beguelin.
Feb. 19. *Franeker.* Cotte.

[1] Journ. de Phys. IX. 272 and 275.

Apr. 9. *Holland and Brussels.* Cotte.
" 9. *St. Petersburg.* Euler.
" 11. *Cambridge.* Winthrop. Lovering.
" 12. *St. Petersburg.* Euler.
May 4. *Holland.* Cotte.
" 5. *Franeker, Holland, Amsterdam, &c.* Cotte.
" 13. *Spain.* Larrea. Rico.
" 21. *Lewarden.* Cotte.
" 30. *Franeker.* Van Swinden. Cotte.
" 31. *Franeker.* Van Swinden. Cotte.
June 28. *Cambridge.* Winthrop. Lovering.
" 28. *Franeker.* Cotte.
July 27. *Cambridge.* Winthrop. Lovering.
" 27. *Portsmouth, N. H.* Stiles. Loomis.
Aug. 6. *Franeker.* Cotte.
" 17. *Berlin.* Beguelin.
" 24. *Franeker and Breda.* Cotte.
" 26. *Montmorenci and Holland.* Cotte.
" 27. *Franeker, Montmorenci, and Holland.* Cotte.
" 30. *St. Petersburg.* Euler.
Sept. 5. *St. Petersburg.* Euler.
" 6. *St. Petersburg.* Euler.
" 7. *Cambridge.* Winthrop. Lovering.
" 7. *Paris.* Detienne. Boué.[1]
" 7. *Franeker and Montmorenci.* Cotte.
" 15. *St. Petersburg.* Euler.
" 24. *Cambridge.* Winthrop. Lovering.
" 24. *Portsmouth, N. H.* Stiles. Loomis.
" 24. *Berlin.* Beguelin. *St. Petersburg.* Euler.
" 24. *Franeker, Montmorenci, and Holland.* Cotte.
" 26. *Perpignan.* Cotte.
" 28. *Franeker.* Cotte.
" 30. *St. Petersburg.* Euler.
Oct. 3. *Geneva.* Deluc.[2]
" 8. *Cambridge.* Winthrop. Lovering.
" 8. *Franeker.* Van Swinden. Cotte.
" 10. *Franeker.* Van Swinden. Cotte.
" 13. *Spain.* Larrea. Rico.
" 22. *Franeker and Holland.* Cotte.
" 24. *Montmorenci.* Cotte.
" 24. *Franeker.* Van Swinden.
" 25. *Franeker.* Van Swinden. Cotte.
Nov. 3. *Cambridge.* Winthrop. Lovering.
" 3. *Berlin.* Beguelin. *Jena.* Zeissing.
" 3. *Franeker, Montmorenci, and Austria.* Cotte.
" 3. *Vienna.* Pilgram. *Paris.* Messier. Reuss.[3]
" 3. *Berlin.* Beguelin. *Jena.* Zeissing.

[1] Journ. de Phys. X. 231–3.
[2] Bull. de l'Acad. Brux. 1842. Pt. 2. p. 6.
[3] Mém. de l'Acad. 1770, p. 440.

Nov. 3. *Vienna.* Pilgram.
" 6. *Holland.* Cotte.
" 7. *Franeker and Holland.* Cotte.
" 9. *Holland.* Cotte.
" 21. *Franeker and Holland.* Cotte.
" 23. *Holland.* Cotte.
" 27. *Cambridge.* Winthrop. Lovering.
" 27. *Portsmouth, N. H.* Stiles. Loomis.
" 27. *Jena.* Zeissing. *St. Petersburg.* Euler. Reuss.[1]
" 27. *Franeker, Montmorenci, Holland, &c.* Cotte.
" 27. *Virginia.* Madison.[2]
" 28. *Cambridge.* Winthrop. Lovering.
Dec. 1. *Holland.* Cotte.
" 2. *Cambridge.* Winthrop. Lovering.
" 2. *Portsmouth, N. H.* Stiles. Loomis.
" 2. *Holland.* Cotte.
" 3. *Berlin.* Beguelin. *Jena.* Zeissing.
" 3. *Franeker, Montmorenci, &c.* Cotte.
" 3. *Vienna.* Pilgram. *Beziers.* Bertholon.
" 3. *Berlin.* Schulze. Reuss.[3] *Vienna.* Pilgram.
" 3. *Gurzelen.* Sprüngli. Wolf.[4]
" 4. *Berlin.* Beguelin.
" 6. *Vienna.* Pilgram.
" 6. *Franeker, Montmorenci, and Holland.* Cotte
" 17. *Holland.* Cotte.
" 18. *Franeker and Holland.* Cotte.
" 21. *Cambridge.* Winthrop. Lovering.
" 27. *Mannheim.* Pilgram.
" 30. *St. Petersburg.* Euler.
" 31. *Chinon.* Cottè.

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Jan. 18. *Cambridge.* Winthrop. Lovering.
" 18. *Franeker.* Van Swinden.[5]
" 18. *Copenhagen.* Cotte. *St. Petersburg.* Euler.[6]
" 19. *Portsmouth, N. H.* Stiles. Loomis.
" 19. *Holland.* Cotte. *St. Petersburg.* Euler.
" 20. *Franeker.* Van Swinden. *Holland.* Cotte.
" 20. *St. Petersburg.* Euler.
" 21. *Franeker.* Van Swinden.
" 21. *Montmorenci and Holland.* Cotte.
" 21. *St. Petersburg.* Euler.

[1] Acta Sci. Acad. Petrop. 1777, Hist. Pt. II. p. 71.
[2] Amer. Phil. Trans. II. 123.
[3] Mém. de l'Acad. Berlin. 1777, p. 106.
[4] Mitt. Naturforsch. Gesell. Bern. 1855, p. 43.
[5] Mém. de l'Acad. Brux. III. 449.
[6] Acta Sci. Acad. Petrop. 1778, Pt. II. p. 358.

Jan. 25. *Vienna.* Pilgram.
" 26. *Franeker.* Van Swinden. *Holland.* Cotte.
" 27. *Holland.* Cotte.
Feb. 1. *St. Petersburg.* Euler.
" 15. *Cambridge.* Winthrop. Lovering.
" 16. *Chinon.* Cotte.
" 17. *Cambridge.* Winthrop. Lovering.
" 17. *Portsmouth, N. H.* Stiles. Loomis.
" 17. *Chinon.* Cotte. *St. Petersburg.* Euler.
" 18. *St. Petersburg.* Euler.
" 25. *Jena.* Zeissing. *Havre.* Dicquemare.[1]
" 25. *Montmorenci, &c.* Cotte.
" 25. *Vienna.* Pilgram. *Franeker.* Van Swinden.
" 25. *St. Petersburg.* Euler.
" 26. *Holland, &c.* Cotte.
" 28. *St. Malo.* Cotte.
Mar. 10. *Perpignan.* Cotte.
" 15. *Gurzelen.* Sprüngli. Wolf.
" 16. *St. Petersburg.* Euler.
" 17. *Cambridge.* Winthrop. Lovering.
" 17. *Beziers.* Bertholon. *Havre.* Diquemare.[2]
" 17. *Franeker and Holland.* Van Swinden.
" 17. *Montmorenci.* Cotte. *St. Petersburg.* Euler.
" 18. *Montmorenci.* Cotte. *St. Petersburg.* Euler.
" 19. *Holland.* Cotte.
" 22. *Cambridge.* Winthrop. Lovering.
" 22. *Berlin.* Beguelin.
" 22. *Franeker.* Van Swinden.
" 22. *Holland.* Cotte. *St. Petersburg.* Euler.
" 24. *Cambridge.* Winthrop. Lovering.
" 25. *Berlin.* Beguelin.
" 26. *Franeker.* Van Swinden.
" 26. *St. Petersburg.* Euler.
" 26. *Montmorenci and Holland, &c.* Cotte.
" 27. *Franeker.* Van Swinden.
" 27. *Holland.* Cotte.
" 31. *Berlin.* Beguelin.[3]
Apr. 10. *St. Petersburg.* Euler.
" 10. *Copenhagen.* Cotte.
" 14. *Jena.* Zeissing.
" 15. *St. Petersburg.* Euler.
" 17. *Berlin.* Beguelin.
" 19. *Berlin.* Beguelin.
" 20. *Cambridge.* Winthrop. Lovering.

[1] Journ. de Phys. XI. 269.
[2] Journ. de Phys. XI. 420.
[3] Dicquemare saw auroras at Havre on the last days of March and on the first ten days of April, 1778. Encyc. Method I. 347.

Apr. 21. *Breda and Holland.* Cotte.
" 21. *St. Petersburg.* Euler.
" 23. *Cambridge.* Winthrop. Lovering.
" 23. *Provence.* Cotte. *St. Petersburg.* Euler.
" 25. *Isle d'Oleron.* Cotte.
" 26. *Cambridge.* Winthrop. Lovering.
" 26. *Berlin.* Beguelin.
May 13. *Cambridge.* Winthrop. Lovering.
" 14. *Franeker.* Van Swinden.
" 14. *Holland.* Cotte.
June 10. *Franeker.* Van Swinden. Cotte.
" 11. *Franeker.* Van Swinden. Cotte.
" 14. *Cambridge.* Winthrop. Lovering.
" 26. *Havre.* Dicquemare.
" 28. *Cambridge.* Winthrop. Lovering.
" 28. *Sinigaglia.* De Toschi de Fagnaro.[1]
" 28. *Franeker.* Van Swinden. Reuss.
" 28. *Montmorenci and Cadiz, &c.* Cotte.
" 28. *Spain.* Rico.
July 3. *Perpignan.* Cotte.
" 7. *Cambridge.* Winthrop. Lovering.
" 15. *Franeker.* Van Swinden. Cotte.
" 31. *Cambridge.* Winthrop. Lovering.
Aug. 12. *Franeker.* Van Swinden.
" 22. *Franeker and Holland.* Cotte.
" 28. *Breda.* Cotte. *Berlin.* Beguelin.
" 28. *St. Petersburg.* Euler.
Sept. 1. *St. Petersburg.* Euler.
" 3. *St. Petersburg.* Euler.
" 11. *Spain.* Rico.
" 12. *St. Petersburg.* Euler.
" 15. *St. Petersburg.* Euler.
" 15. *Franeker.* Van Swinden.
" 17. *Franeker.* Van Swinden.
" 17. *Montmorenci.* Cotte. *St. Petersburg.* Euler.
" 18. *Copenhagen and Holland.* Cotte.
" 18. *Berlin.* Beguelin.
" 19. *Viviers.* Cotte.
" 20. *Mur-de-Barez.* Cotte.
" 21. *Franeker.* Van Swinden.
" 21. *Montmorenci, Holland, &c.* Cotte.
" 21. *Jena.* Zeissing. *St. Petersburg.* Euler.
" 22. *Cambridge.* Winthrop. Lovering.
" 22. *New Haven.* Stiles. Loomis.
" 22. *Montmorenci, Bordeaux, &c.* Cotte.
" 22. *Louvain.* Chevalier.[2] *St. Petersburg.* Euler.
" 22. *Jena.* Zeissing. *Bildersael.* Pilgram.

[1] Journ. de Phys. X. 232. Mém. de l'Acad. Berlin, 1779. p. 14.
[2] Mém. de l'Acad. Brux. III. p. xxvi.

Sept. 23. *Copenhagen and Dijon.* Cotte.
" 24. *Cambridge.* Winthrop. Lovering.
" 24. *New Haven.* Stiles. Loomis.
" 24. *Dijon, &c.* Cotte.
" 25. *New Haven.* Stiles. Loomis.
" 27. *Holland.* Cotte.
" 30. *St. Petersburg.* Euler.
" 30. *Berlin.* Beguelin.
Oct. 9. *Holland.* Cotte.
" 14. *Franeker.* Van Swinden. *Berlin.* Beguelin.
" 14. *Montmorenci, Holland, &c.* Cotte.
" 14. *Louvain.* Chevalier.
" 15. *Holland.* Cotte.
" 19. *Holland.* Cotte.
" 23. *Franeker.* Van Swinden. Cotte.
" 25. *Spain.* Rico.[1]
" 26. *Holland.* Cotte.
" 27. *Holland.* Cotte.
Nov. 20. *St. Petersburg.* Euler.
" 24. *Holland.* Cotte.
Dec. 3. ——— Bertholon.[2]
" 6. *St. Petersburg.* Euler.
" 7. *Holland.* Cotte.
" 8. *Franeker.* Van Swinden. Cotte.
" 10. *St. Petersburg.* Euler.
" 13. *Jena.* Zeissing. *St. Petersburg.* Euler.
" 14. *Troies.* Cotte.
" 15. *Holland.* Cotte.
" 17. *Franeker.* Van Swinden.[3] Cotte.
" 17. *St. Petersburg.* Euler.
" 26. *Montmorenci.* Cotte.

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Jan. 6. *Brussels.* Durondean.[4]
" 9. *Franeker.* Cotte.
" 10. *Holland and Brussels.* Cotte.
" 12. *Holland.* Cotte.
Jan. 13. *Franeker.* Cotte.
" 14. *Saint Saturnin.* Cotte.
" 19. *St. Petersburg.* Euler.[5]
Feb. 4. *Franeker.* Cotte.

[1] Mem. Acad. Cienc. Madrid. III. 77.
[2] Journ. de Phys. XI. 269. and XII. 359.
[3] Van Swinden suspected auroras on Apr. 27, May 19, 26, and 28, June 12 and 14, Sept. 12 and 18, and Oct. 13 and 17, of this same year. There were twenty-three auroras at Brussels in this year. Mém. de l'Acad. Brux. III. Table.
[4] Mém. de l'Acad. Brux. III. Appendix.
[5] Acta. Sci. Acad. Petrop. 1779, Pt. II. p. 414.

Feb. 6. *Franeker and Holland.* Cotte.
" 7. *St. Petersburg.* Euler.
" 9. *Holland, &c.* Cotte. *Brussels.* Durondeau.
" 9. *Spain.* Rico.[1]
" 10. *Cambridge.* Winthrop. Lovering.
" 10. *Bordeaux.* Cotte. *Spain.* Rico.
" 10. *Berlin.* Beguelin. *Jena.* Zeissing.
" 10. *St. Petersburg.* Euler.
" 11. *Cambridge.* Winthrop. Lovering.
" 11. *Montmorenci, Holland, &c.* Cotte.
" 11. *St. Petersburg.* Euler.
" 11. *Gurzelen.* Sprüngli. Wolf.
" 12. *Franeker, Holland, &c.* Cotte.
" 12. *St. Petersburg.* Euler.
" 13. *Cambridge.* Winthrop. Lovering.
" 13. *Berlin.* Beguelin. *Beziers.* Bertholon.
" 13. *Holland, &c.* Cotte. *St. Petersburg.* Euler.
" 13. *Gurzelen.* Sprüngli. Wolf.
" 13. *Jena.* Zeissing. *Vienna.* Pilgram.
" 14. *Marseilles, &c.* Cotte. *Jena.* Zeissing.
" 15. *Montmorenci.* Cotte. *St. Petersburg.* Euler.
" 15. *Jena.* Zeissing. *Spain.* Rico.
" 15. *Franeker and Copenhagen.* Cotte.
" 15. *Berlin.* Beguelin. *Beziers.* Bertholon.
" 16. *Berlin.* Beguelin.
" 18. *Nanci.* Cotte.
" 19. *Dieppe.* Cotte.
" 25. *St. Petersburg.* Euler.
Mar. 2. *Franeker.* Cotte.
" 5. *St. Petersburg.* Euler.
" 13. *St. Petersburg.* Euler.
" 14. *St. Petersburg.* Euler.
" 14. *Nanci, &c.* Cotte. *Vienna.* Pilgram.
" 14. *Spain.* Rico.[2] *Gurzelen.* Sprüngli. Wolf.
" 15. *St. Petersburg.* Euler.
" 24. *Franeker and Brussels.* Cotte.
" 25. *Montmorenci.* Cotte.
" 25. *Franeker, Holland, &c.* Cotte.
" 25. *St. Petersburg.* Euler.
" 25. *Jena.* Zeissing. *Brussels.* Durondeau.
" 30. *Copenhagen and Montmorenci.* Cotte.
" 31. *Copenhagen.* Cotte.
Apr. 2. *Nanci.* Cotte.
" 4. *Franeker.* Cotte.
" 5. *Cambridge.* Winthrop. Lovering.
" 7. *Montmorenci.* Cotte.
" 8. *Brussels.* Cotte. *St. Petersburg.* Euler.

[1] Mem. Acad. Cienc. Madrid. III. 77.
[2] Mem. Acad. Cienc. Madrid. III. 77.

Apr. 9. *Franeker and Brussels.* Cotte.
" 9. *St. Petersburg.* Euler.
" 10. *Nanci.* Cotte. *Berlin.* Beguelin.
" 11. *Les Essarts.* Cotte.
" 13. *Viviers.* Cotte. *St. Petersburg.* Euler.
" 14. *St. Petersburg.* Euler.
" 17. *St. Petersburg.* Euler.
" 18. *Franeker.* Cotte. *Brussels.* Durondeau.
" 20. *Franeker and Holland.* Cotte.
" 20. *Copenhagen and Rome, &c.* Cotte.
" 20. *St. Petersburg.* Euler.
" 21. *Brussels.* Durondeau. *Beziers.* Bertholon.
" 22. *Nanci.* Cotte.
" 28. *Brussels.* Cotte.
May 2. *Brussels.* Cotte.
" 4. *Berlin.* Beguelin.
" 6. *Berlin.* Beguelin.
" 7. *Berlin.* Beguelin.
" 8. *Berlin.* Beguelin.
" 10. *Berlin.* Beguelin. *St. Petersburg.* Euler.
" 11. *Montmorenci.* Cotte. *Berlin.* Beguelin.
" 12. *Berlin.* Beguelin.
" 13. *Berlin.* Beguelin.
" 15. *Berlin.* Beguelin.
" 17. *Berlin.* Beguelin.
" 20. *Brussels.* Cotte.
" 22. *Copenhagen.* Cotte.
" 24. *Montmorenci.* Cotte. *Brussels.* Durondeau.
" 24. *Franeker, Holland, &c.* Cotte.
" 25. *Brussels.* Durondeau.
June 3. *Brussels.* Cotte.
" 5. *Brussels.* Cotte.
" 14. *Isle d' Oleron.* Cotte.
" 15. *Isle d' Oleron.* Cotte.
" 20. *Montmorenci.* Cotte.
" 24. *Isle d' Oleron.* Cotte.
July 9. *Brussels.* Durondeau. *Bordeaux.* Cotte.
" 15. *Brussels.* Durondeau. *Bordeaux.* Cotte.
" 17. *Brussels.* Cotte.
" 20. *Bordeaux.* Cotte.
Aug. 3. *Franeker and Nanci.* Cotte.
" 4. *Leyden.* Cotte.
" 8. *St. Petersburg.* Euler.
" 14. *Rouen.* Cotte.
" 17. *Franeker.* Cotte.
" 20. *Brussels and Copenhagen.* Cotte.
" 26. *Copenhagen.* Cotte.
" 28. *Franeker.* Cotte.
" 29. *Franeker, Holland, &c.* Cotte.
" 29. *Montmorenci.* Cotte.
Aug. 30. *Nanci.* Cotte.
Sept. 2. *Copenhagen.* Cotte. *St. Petersburg.* Euler.
" 4. *St. Petersburg.* Euler.
" 8. *Holland.* Cotte.
" 10. *Franeker and Copenhagen.* Cotte.
" 11. *Holland.* Cotte.
" 14. *St. Petersburg.* Euler.
" 14. *Copenhagen.* Cotte.
" 15. *St. Petersburg.* Euler.
" 17. *Brussels.* Cotte.
" 18. *Berlin.* Beguelin. *Jena.* Zeissing.
" 18. *Montmorenci.* Cotte.
" 18. *Gurzelen.* Sprüngli. Wolf.
" 18. *Berlin.* Beguelin. *Marseilles, &c.* Cotte.
" 18. *Jena.* Zeissing.[1] *Beziers.* Bertholon.
" 19. *Mezin.* Cotte. *Jena.* Zeissing.
" 22. *Strasbourg.* Cotte. *St. Petersburg.* Euler.
" 24. *St. Petersburg.* Euler.
" 28. *Franeker and Copenhagen.* Cotte.
" 28. *St. Petersburg.* Euler.
" 29. *Nanci.* Cotte. *St. Petersburg.* Euler.
Oct. 3. *Montmorenci and Holland.* Cotte.
" 3. *St. Petersburg.* Euler.
" 4. *Franeker.* Cotte.
" 9. *Copenhagen.* Cotte.
" 12. *Brussels.* Durondeau.
" 14. *St. Petersburg.* Euler.
" 14. *Montmorenci.* Cotte.
" 14. *Franeker and Holland, &c.* Cotte.
" 15. *Brussels.* Durondeau.
" 17. *Franeker and Copenhagen.* Cotte.
" 17. *Brussels.* Durondeau. *St. Petersburg.* Euler.
" 19. *Perpignan.* Cotte.
" 22. *Holland.* Cotte.
" 28. *St. Petersburg.* Euler.
Nov. 3. *St. Petersburg.* Euler.
" 7? *Saint Saturnin.* Cotte.
" 8. *Isle d' Oleron.* Cotte.
" 9. *Franeker, Holland, &c.* Cotte.
" 9. *Montmorenci.* Cotte. *Spain.* Rico.[2]
" 9. *Brussels.* Durondeau. *Vienna.* Pilgram.
" 9. *Berlin.* Beguelin. *Beziers.* Bertholon.
" 12. *Lucon.* Cotte.
" 12. *Holland, &c.* Cotte. *Brussels.* Durondeau.
" 13. *Montmorenci and Livourne.* Cotte.
" 14. *Berlin.* Beguelin.
" 15. *Holland.* Cotte.

[1] The aurora was observed four times at Jena in October.
[2] Mem. Acad. Cienc. Madrid. III. 77.

Nov. 18. *Nanci.* Cotte.
" 25. *St. Petersburg.* Euler.
" 27. *Gurzelen.* Sprüngli. Wolf.
Dec. 3. *St. Petersburg.* Euler.
" 5. *Brussels.* Durondeau. *Vienna.* Pilgram.
" 5. *Montmorenci.* Cotte.
" 5. *Franeker and Holland.* Cotte.
" 6. *Montmorenci.* Cotte.
" 6. *Franeker and Holland.* Cotte.
" 6. *Brussels.* Durondeau.
" 8. *Franeker.* Cotte.
" 9. *Jena.* Zeissing. *St. Petersburg.* Euler.
" 10. *Brussels.* Durondeau.

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Feb. 5. *St. Petersburg.* Schröter and Euler.[1]
" 11. *Franeker and Holland.* Cotte.
" 15. *St. Petersburg.* Schröter and Euler.
" 22. *Montmorenci.* Cotte.
" 29. *St. Petersburg.* Schröter and Euler.
" 29. *All over Europe.* Cotte. *Spain.* Rico.[2]
" 29. *Jena.* Zeissing. *Beziers.* Bertholon.
" 29. *Turin.*[3] Morozzo. *Vienna.* Pilgram.
" 29. *Padua.* Toaldo. Reuss.[4]
" 29. *Gurzelen.* Sprüngli. Wolf.
" 29. *Geneva.* Deluc.[5] *Berne.* Studer.
" 29. *Turin.* Morozzo.[6] Boué.
Mar. 1. *Perpignan.* Cotte.
" 2. *Pleskow.* De Brekling.[7] Reuss. Boué.
" 2. *New Haven.* Stiles. Loomis.
" 2. *St. Petersburg.* Schröter, and Euler.
" 29. *Montmorenci.* Cotte.
" 30. *New Haven.* Stiles. Loomis.
" 30. *Chinon.* Cotte.
" 31. *Chinon.* Cotte.
Apr. 4. *Berlin.* Beguelin.
" 6. *Jena.* Zeissing.
" 13. *St. Petersburg.* Schröter and Euler.
May 8. ——— D'Orbessan. Reuss and Boué.[8]
June 15. *Montmorenci.* Cotte.
" 23. *New Haven.* Stiles. Loomis.

[1] Acta Sci. Acad. Petrop. 1780, p. 396.
[2] Mem. Acad. Cienc. Madrid. III. 77.
[3] Mém. de l'Acad. Toulouse. II. 20.
[4] Saggi Acad. di Padua. I. 78.
[5] Mitt. Naturforsch. Gesell. Bern. 1855, p. 44.
[6] Mém. de l'Acad. Turin. II. 328.
[7] Acta Sci. Acad. Petrop. 1780, p. 15.
[8] Mém. de l'Acad. Toulouse. II. 26.

June 24. *New Haven.* Stiles. Loomis.
July 9. *New Haven.* Stiles. Loomis.
" 11. *New Haven.* Stiles. Loomis.
" 27. *New Haven.* Stiles. Loomis.
" 28. *New Haven.* Stiles. Loomis.
" 28. *Geneva?* Deluc.[1] *Frankfort.* Pilgram.
" 28. *Germany.* Boeckman.[2] *Spain.* Rico.
" 28. *Jena.* Zeissing. Reuss and Cotte.
" 28. *Italy.* Volta.[3] *Bildersael.* Pilgram.
" 28. *Gurzelen.* Sprüngli. Wolf. *Berne.* Studer.
" 29. *New Haven.* Stiles. Loomis.
" 29. *Europe.* Cotte.
Aug. 2. *New Haven.* Stiles. Loomis.
" 27. *St. Petersburg.* Schröter and Euler.
Sept. 2. *St. Petersburg.* Schröter and Euler.
" 3. *St. Petersburg.* Schröter and Euler.
" 4. *St. Petersburg.* Schröter and Euler.
" 7. *St. Petersburg.* Schröter and Euler.
" 10. *St. Petersburg.* Schröter and Euler.
" 11. *St. Petersburg.* Schröter and Euler.
" 21. *New Haven.* Stiles. Loomis.
" 22. *Franeker and Montmorenci.* Cotte.
" 22. *St. Petersburg.* Schröter and Euler.
" 27. *Franeker and Montmorenci.* Cotte.
Oct. 4. *St. Petersburg.* Schröter and Euler.
" 6. *Jena.* Zeissing.
" 10. *Barbadoes.* Blane. Boué.[4]
" 24. *St. Petersburg.* Schröter and Euler.
" 28. *St. Petersburg.* Schröter and Euler.
" 30. *New Haven.* Stiles. Loomis.
" 30. *Francker, Geneva, &c.* Cotte.
Nov. *x.* *New Haven.* Stiles. Loomis
" 4. *Berlin.* Cotte.
" 14. *Jena.* Zeissing.
" 19. *New Haven.* Stiles. Loomis.
" 20. *New Haven.* Stiles. Loomis.
" 20. *St. Petersburg.* Schröter and Euler.
" 21. *Franeker.* Cotte.
" 22. *New Haven.* Stiles. Loomis.
" 23. *New Haven.* Stiles. Loomis.
" 23. *St. Petersburg.* Schröter and Euler.
" 25. *New Haven.* Stiles. Loomis.
" 25. *Gurzelen.* Sprüngli. Wolf. *Berne.* Studer.
" 25. *Franeker, La Rochelle, &c.* Cotte.
" 16. *St. Petersburg.* Euler.

[1] Bull. de l'Acad. Brux. IX. Pt. II. 6.
[2] Mém. de l'Acad. Berlin. 1780, p. 17.
[3] Phil. Trans. LXXII. Pt. I. p. xv.
[4] Roy. Soc. Edin. I. 34.

Nov. 25. *Vienna.* Pilgram. *Geneva.* Deluc.[1]
" 26. *La Rochelle.* Cotte.
" 26. *New Haven.* Stiles. Loomis.
" 27. *New Haven.* Stiles. Loomis.
" 28. *New Haven.* Stiles. Loomis.
" 29. *New Haven.* Stiles. Loomis.
Dec. 15. *New Haven.* Stiles. Loomis.
" 19. *New Haven.* Stiles. Loomis.
" 19. *Berlin.* Beguelin.
" 19. *St. Petersburg.* Schröter and Euler.
" 25. *St. Petersburg.* Schröter and Euler.
" 27. *New Haven.* Stiles. Loomis.
" 30. *Trieste.* Pilgram.
" 31. *Trieste.* Pilgram.

1781.

Jan. 1. *Trieste.* Pilgram.
" 17. *Ipswich, Mass.* Cutler.[2]
" 17. *New Haven.* Stiles. Loomis.
" 17. *St. Petersburg.* Euler.[3]
" 21. *New Haven.* Stiles. Loomis.
" 21. *Abbatias S. Zenonis.*[4]
" 22. *St. Petersburg.* Euler.
" 23. *St. Petersburg.* Euler.
" 25. *Ipswich.* Cutler.
" 28. *Mannheim.* Hemmer. Pilgram.
" 29. *New Haven.* Stiles. Loomis.
" 30. *Ipswich.* Cutler.
" 30. *Munich.* Huebpauer. *Padua.* Toaldo.
" 30. *Ratisbon.* Heinrich. *Vienna.* Pilgram.
" 30. *Sagan.* Preuss. *Beziers.* Bertholon.
" 30. *Montmorenci.* Cotte.[5]
" 31. *Ipswich.* Cutler.
" 31. *Peissenberg.* Fischer and Schlögel.
Feb. 2. *Mannheim.* Hemmer.
" 5. *Montmorenci.* Cotte.
" 15. *Ipswich, Mass.* Cutler.
" 15. *New Haven.* Stiles. Loomis.
" 15. *Beziers.* Bertholon. *Berlin.* Beguelin.
" 15. *Mannheim.* Hemmer.
" 15. *Ratisbon.* Heinrich.
" 15. *Padua.* Toaldo. *Montmorenci.* Cotte.
" 16. *Mannheim.* Hemmer. Pilgram.
Feb. 21. *St. Petersburg.* Euler.
Mar. 14. *St. Petersburg.* Euler.

[1] L'Institut. X. 341.
[2] Mem. Amer. Acad. I. 337.
[3] Acta Sci. Acad. Petrop. 1781. Pt. II. 409.
[4] Observer unknown. Ephem. Soc. Met. Palat. I. 404.
[5] Journ. des Savans. 1782, p. 163.

Mar. 14. *Mannheim.* Hemmer. *Wurtemberg.* Pilgram.
" 14. *Montmorenci.* Cotte.
" 16. *New Haven.* Stiles. Loomis.
" 16. *St. Petersburg.* Euler.
" 19. *Berlin.* Beguelin. *Mannheim.* Pilgram.
" 20. *Mannheim.* Hemmer.
" 20. *Erfurt.* Planer. Pilgram.
" 22. *St. Petersburg.* Euler.
" 23. *Padua.* Toaldo.
" 27. *Cambridge.* Gannett.[1]
" 27. *Cambridge.* Wigglesworth.[1] Lovering.
" 27. *Ipswich.* Cutler. *Dover, N. H.* Belknap.[2]
" 27. *New Haven.* Stiles. Loomis.
" 27. Watermeyer. Jahn.
" 27. *Mannheim.* Hemmer. Pilgram and Reuss.
" 27. *Erfurt.* Planer. Ratisbon. Heinrich.
" 27. *London.* Cavallo.[3] *Montmorenci.* Cotte.
" 27. *Franeker.* Van Swinden. Boué.
" 28. *New Haven.* Stiles. Loomis.
" 28. *Berlin.* Beguelin. Pilgram.
" 28. *Mannheim.* Hemmer. Bertholon.[4]
" 28. *St. Petersburg.* Euler.
" 28. *Montmorenci.* Cotte.
" 29. *Ipswich.* Cutler. *St. Petersburg.* Euler.
" 29. *Berlin.* Beguelin. *Mannheim.* Hemmer.
" 29. *Erfurt.* Planer. *Sagan.* Preuss. Pilgram.
" 29. *Montmorenci.* Cotte.
" 31. *St. Petersburg.* Euler.
Apr. 4. *Mannheim.* Hemmer.
" 13. *New Haven.* Stiles. Loomis.
" 13. *St. Petersburg.* Euler.
" 14. *New Haven.* Stiles. Loomis.
" 14. *Mannheim.* Hemmer.
" 15. *New Haven.* Stiles. Loomis.
" 15. *Erfurt.* Planer. *Mannheim.* Pilgram.
" 15. *Montmorenci.* Cotte.
" 16. *St. Petersburg.* Euler.
" 17. *New Haven.* Stiles. Loomis.
" 17. *St. Petersburg.* Euler.
" 19. *St. Petersburg.* Euler.
" 21. *Mannheim.* Hemmer.
" 24. *Mannheim.* Hemmer. Pilgram.
" 25. *St. Petersburg.* Euler.
" 26. *St. Petersburg.* Euler.
" 28. *St. Petersburg.* Euler.
May 4. *Ratisbon.* Heinrich.

[1] Mem. Amer. Acad. II. 136. Also N. S. IX. 115.
[2] Amer. Phil. Trans. II. 196.
[3] Phil. Trans. LXXI. 329.
[4] Encyc. Method. I. 362.

May 11. *East Hartford, Conn.* Stiles. Loomis.
" 11. *Berlin.* Beguelin.
" 14. *Berlin.* Beguelin.
" 16. *Berlin.* Beguelin.
" 17. *Brimfield, Mass.* Stiles. Loomis.
" 17. *Berlin.* Beguelin.
" 18. *Berlin.* Beguelin.
June 7. *New Haven.* Stiles. Loomis.
" 8. *Ratisbon.* Heinrich.
" 8. *Mannheim.* Pilgram. *Jena.* Zeissing.
" 9. *New Haven.* Stiles. Loomis.
" 9. *Mannheim.* Hemmer. Pilgram.
" 19. *Mannheim.* Hemmer. Pilgram.
" 20. *Ipswich.* Cutler. *New Haven.* Stiles. Loomis.
" 28. *Ratisbon.* Heinrich.
" 29. *Ratisbon.* Heinrich.
July 8. *Mannheim?* Hemmer. Pilgram.
" 9. *New Haven.* Stiles. Loomis.
" 22. *Montmorenci.* Cotte.
Aug. 6. *Ipswich.* Cutler.
" 8. *Cambridge.* Gannett.[1]
" 8. *New Haven.* Stiles. Loomis.
" 12. *St. Petersburg.* Euler.
" 14. *Ipswich.* Cutler.
" 16. *Würzburg.* Egel.
" 17. *New Haven.* Stiles. Loomis.
" 20. *Ipswich.* Cutler. *New Haven.* Stiles. Loomis.
" 21. *Ipswich.* Cutler. *Montmorenci.* Cotte.
" 21. *Mannheim.* Hemmer. Pilgram.
" 22. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 23. *Cambridge.* Gannett.
" 23. *Sagan.* Preus.
" 25. *Montmorenci.* Cotte.
" 26. *Mannheim.* Hemmer. Pilgram.
Sept. 3. *Mannheim.* Hemmer. Pilgram.
" 7. *Würzburg.* Egel.
" 8. *Montmorenci.* Cotte.
" 9. *Würzburg.* Egel.
" 18. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 18. *New Haven.* Stiles. Loomis.
" 18. *Berlin.* Beguelin. *St. Petersburg.* Euler.
" 18. *Peissenberg.* Fischer and Schlögel.
" 19. *Cambridge.* Gannett.
" 19. *Berlin.* Beguelin. *Sagan.* Preus.
" 22. *Prague.* Strnad.
" 23. *Erfurt.* Planer. *Jena.* Zeissing.
" 23. *Paris.* Bertholon.[2] *St. Petersburg.* Euler.

[1] Mem. Amer. Acad. I. 327.
[2] Encyc. Method. I. 362.

Sept. 23. *Montmorenci.* Cotte.
" 24. *Erfurt.* Planer. *Jena.* Zeissing. Pilgram.
" 24. *Mannheim.* Hemmer. *Berlin.* Beguelin.
" 24. *St. Petersburg.* Euler. *Montmorenci.* Cotte.
" 25. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 25. *New Haven.* Stiles. Loomis.
" 25. *Slough.* Herschel.[1] *Montmorenci.* Cotte.
" 25. *Mount St. Andex, Bavaria.* Kettel.
" 25. *St. Petersburg.* Euler.
" 26. *St. Petersburg.* Euler.
Oct. 3. *St. Petersburg.* Euler.
" 4. *Mannheim.* Hemmer. Pilgram.
" 8. *Ipswich.* Cutler.
" 14. *Prague.* Strnad.
" 15. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 15. *New Haven.* Stiles. Loomis.
" 15. *Ratisbon.* Heinrich. *Sagan.* Preus.
" 15. *Peissenberg.* Fischer and Schlögel.
" 15. *Padua.* Toaldo.
" 15. *Erfurt.* Planer. *Mannheim.* Hemmer.
" 16. *Erfurt.* Planer. *Prague.* Strnad.
" 16. *Sagan.* Preus. *St. Petersburg.* Euler.
" 19. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 19. *Mannheim.* Hemmer. *Sagan.* Preus. Pilgram.
" 19. *Berlin.* Beguelin. *Munich.* Huebpauer.
" 21. *Sagan.* Preus.
Nov. 8. *Sagan?* Preus.
" 13. *Cambridge.* Gannett. *Sagan?* Preus.
" 14. *Cambridge.* Gannett.
" 15. *Cambridge.* Gannett. *Erfurt.* Planer.
" 15. *St. Petersburg.* Euler.
" 16. *Ipswich.* Cutler.
" 18. *Sagan?* Preus.
" 19. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 19. *New Haven.* Stiles. Loomis.
" 19. *Mannheim.* Hemmer. Pilgram.
Dec. 9. *St. Petersburg.* Euler.
" 10. *Prague.* Strnad.
" 11. *Ipswich.* Cutler. *Jena.* Zeissing.
" 11. *New Haven.* Stiles. Loomis.
" 11. *Mannheim.* Hemmer. *Berlin.* Beguelin.
" 11. *Sagan.* Preus. *Padua.* Toaldo. Pilgram.
" 12. *Berlin.* Beguelin. *Würzburg.* Egel.
" 16. *Erfurt.* Planer. *St. Petersburg.* Euler.
" 19. *Erfurt.* Planer.
" 22. *Erfurt.* Planer.
" 30. *St. Petersburg.* Euler.

[1] Nicholson's Journal. VI. 13.

1782.

Jan. 2. *Ipswich.* Cutler.
" 4. *Prague.* Strnad.
" 5. *Mannheim.* Koenig.
" 8. *Berlin.* Beguelin.
" 9. *Mannheim.* Hemmer. Koenig. *Sagan.* Preus.
" 10. *Mannheim.* Hemmer, &c.
" 10. *St. Petersburg.* Euler.[1]
" 12. *Mannheim.* Hemmer.
Feb. 3. *St. Petersburg.* Euler.
" 3. *Berlin.* Beguelin. *Erfurt.* Planer.
" 6. *Ipswich.* Cutler.
" 15. *Tigurina Aedes, Bavaria.* Gothard.
" 16. *Prague.* Strnad. *Tigurina Aedes.* Gothard.
" 17. *Tigurina Aedes.* Gothard.
" 18. *St. Petersburg.* Euler.
" 25. *Prague.* Strnad. *Bologna.* Matteucci.
" 25. *Beziers.* Bertholon.[2]
Mar. 7. *Copenhagen.* Bugge?
" 9. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 9. *Mannheim.* Koenig. *Sagan.* Preus.
" 10. *New Haven.* Stiles. Loomis.
" 10. *Berlin.* Beguelin. *Prague.* Strnad.
" 10. *Copenhagen.* Bugge? *Sagan.* Preus.
" 14. *Copenhagen.* Bugge.
" 15. *Mannheim.* Hemmer, &c. *Berlin.* Beguelin.
" 15. *Montmorenci.* Cotte.[3]
" 15. *Copenhagen.* Bugge. *Sagan.* Preus.
" 17. *Berlin.* Beguelin. *Copenhagen.* Bugge.
" 17. *St. Petersburg.* Euler.
" 19. *St. Petersburg.* Euler.
" 29. *St. Petersburg.* Euler.
" 30. *St. Petersburg.* Euler.
" 31. *Ratisbon.* Heinrich.
Apr. 1. *New Haven.* Stiles. Loomis.
" 2. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 4. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 6. *St. Petersburg.* Euler.
" 7. *St. Petersburg.* Euler.
" 13. *New Haven.* Stiles. Loomis.
" 14. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 27. *Copenhagen.* Bugge. *Montmorenci.* Cotte.
May 4. *New Haven.* Stiles. Loomis.
" 4. *St. Petersburg.* Euler.
" 5. *Ipswich.* Cutler. *St. Petersburg.* Euler.
" 5. *Mannheim.* Hemmer. *Copenhagen.* Bugge.

[1] Acta Sci. Acad. Petrop., 1782. Pt. II., p. 371.
[2] Encyc. Method. I. 367.
[3] Journ. des Savans, 1782–3.

May 6. *Ipswich.* Cutler. *New Haven.* Stiles. Loomis.
" 7. *Padua.* Toaldo and Chiminello.
" 7. *Montmorenci.* Cotte.
" 9. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 9. *Mannheim.* Hemmer and Koenig.
" 16. *Vienna.* Pilgram.
" 17. *St. Petersburg.* Euler.
" 18. *Vienna.* Pilgram.
" 20. *Berlin.* Beguelin.
" 22. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 23. *Berne.* Studer.
" 24. *New Haven.* Stiles. Loomis.
June 1. *New Haven.* Stiles. Loomis.
" 4. *Padua.* Toaldo and Chiminello.
" 5. *Ipswich.* Cutler. *Mannheim.* Koenig.
" 6. *Ipswich.* Cutler. *New Haven.* Stiles. Loomis.
" 13 *Mannheim.* Hemmer, &c.
July.[1] 9. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 10. *Cambridge.* Gannett.
" 20. *Ipswich.* Cutler. *New Haven.* Stiles. Loomis.
" 20. *Mannheim.* Hemmer and Koenig.
" 31. *Padua.* Toaldo and Chiminello.
Aug. 4. *St. Petersburg.* Euler.
" 5. *New Haven.* Stiles. Loomis.
" 12. *New Haven.* Stiles. Loomis.
" 22. *St. Petersburg.* Euler.
" 26. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 26. *New Haven.* Stiles. Loomis.
" 27. *New Haven.* Stiles. Loomis.
" 28. *Ipswich.* Cutler. *New Haven.* Stiles. Loomis.
" 30. *Slough.* Herschel.[2]
Sept. 2. *The Hague.* Van Swinden.
" 2. *Brussels.* Durondeau?[3]
" 2. *St. Petersburg.* Euler.
" 3. *St. Petersburg.* Euler.
" 5. *Ipswich.* Cutler.
" 6. *Ipswich.* Cutler. *St. Petersburg.* Euler.
" 6. *Sagan.* Preus. *The Hague.* Van Swinden.
" 9. *New Haven.* Stiles. Loomis.
" 10. *Mannheim.* Hemmer. *St. Petersburg.* Euler.
" 12. *Cambridge.* Wigglesworth. Lovering.
" 12. *Ipswich.* Cutler.
" 12. *The Hague.* Van Swinden. *Padua.* Toaldo.
" 12. *Mannheim.* Hemmer, &c. *Berlin.* Beguelin.
" 12. *St. Petersburg.* Euler.
" 13. *Cambridge.* Wigglesworth. Lovering.

[1] One aurora was seen at Berlin this month, but the day is not given by Beguelin.
[2] Nicholson's Journal, VI. 13.
[3] Mém. de l'Acad. Brux. IV. 607.

Sept. 13. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 13. *New Haven.* Stiles. Loomis.
" 13. *Mannheim.* Hemmer, &c. *Ratisbon.* Heinrich.
" 13. *The Hague.* Van Swinden. *Prague.* Strnad.[1]
" 13. *St. Petersburg.* Euler.
" 14. *Cambridge.* Gannett.
" 15. *Ipswich.* Cutler. *Brussels.* Mann.
" 22. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 22. *St. Petersburg.* Euler.
" 29. *Cambridge.* Gannett.
" 30. *Cambridge.* Wigglesworth. Lovering.
" 30. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 30. *New Haven.* Stiles. Loomis.
" 30. *Mannheim.* Hemmer, &c.
" 30. *St. Petersburg.* Euler. *Montmorenci.* Cotte.
" 30. *Brussels.* Durondeau?
Oct.[1] 1. *New Haven.* Stiles. Loomis.
" 1. *Berlin.* Beguelin. *Erfurt.* Planer.
" 1. *Copenhagen.* Bugge. *St. Petersburg.* Euler.
" 1. *Montmorenci.* Cotte. *Sagan.* Preus.
" 2. *Cambridge.* Wigglesworth. Lovering.
" 2. *Cambridge.* Gannett.
" 3. *Cambridge.* Wigglesworth. Lovering.
" 3. *Montmorenci.* Cotte. *Sagan.* Preus.
" 5. *St. Petersburg.* Euler.
" 8. *Copenhagen.* Bugge. *Peissenberg.* Schwaiger.
" 8. *Mannheim.* Hemmer, &c. *Berlin.* Beguelin.
" 8. *Rochelle.* Seignette. *Buda.* Weiss.
" 8. *St. Petersburg.* Euler.
" 9. *Cambridge.* Gannett.
" 9. *New Haven.* Stiles. Loomis.
" 9. *Montmorenci.* Cotte.
" 9. *Middleburg.* Van de Perre.
" 9. *Berlin.* Beguelin. *Ratisbon.* Heinrich.
" 10. *Cambridge.* Wigglesworth. Lovering.
" 10. *Cambridge.* Gannett.
" 11. *St. Petersburg.* Euler.
" 14. *St. Petersburg.* Euler.
" 17. *Berlin.* Beguelin.
" 26. *Cambridge.* Gannett.
Nov. 19. *Copenhagen.* Bugge.
" 20. *St. Petersburg.* Euler.
" 26. *Cambridge.* Wigglesworth. Lovering.
" 26. *Ipswich.* Cutler. *New Haven.* Stiles. Loomis.
" 26. *St. Petersburg.* Euler.
Dec. 29. *Copenhagen.* Bugge.
" 31. *Sagan.* Preus.

[1] Auroras were frequent in Ipswich in the first part of this month. Two occurred in Brussels: but the dates are not given in the Mém. de l'Acad. Brux. iv.

1783.

Jan. 9. *Dijon.* Maret.
" 13. *Mannheim.* Hemmer.
" 26. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 26. *New Haven.* Stiles. Loomis.
" 30. *Erfurt.* Planer.
" 31. *Cambridge.* Wigglesworth. Lovering.
Feb. 1. *New Haven.* Stiles. Loomis.
" 2. *Cambridge.* Wigglesworth. Lovering.
" 2. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 12. *Tigurina Aedes.* Gothard.
" 21. *Cambridge.* Gannett.
" 27. *Cambridge.* Wigglesworth. Lovering.
" 27. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 27. *New Haven.* Stiles. Loomis.
" 27. *St. Petersburg.* Euler.[1]
" 28. *Lübeck.* Behn. *St. Petersburg.* Euler.
Mar. 1. *St. Petersburg.* Euler.
" 2. *Cambridge.* Wigglesworth. Lovering.
" 2. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 4. *Cambridge.* Wigglesworth. Lovering.
" 4. *Stockholm.* Nicander. *Erfurt.* Planer.
" 4. *Lübeck.* Behn. *Sagan.* Preus.
" 4. *Copenhagen.* Bugge.
" 9. *Cambridge.* Gannett.
" 16. *Berlin.* Beguelin.
" 18. *Padua.* Toaldo and Chiminello.
" 20. *Jena.* Zeissing.
" 21. *Sagan.* Preus. Hey.
" 22. *Prague.* Strnad.
" 24. *New Haven.* Stiles. Loomis. *Padua.* Toaldo.
" 25. *Sagan.* Preus.
" 26. *Cambridge.* Wigglesworth. Lovering.
" 26. *Ipswich.* Cutler. *Dover, N. H.* Belknap.[2]
" 26. *Slough.* Herschel. Hey. *St. Petersburg.* Euler.
" 27. *Cambridge.* Gannett.
" 27. *New Haven.* Stiles. Loomis.
" 27. *St. Petersburg.* Euler.
" 29. *Cambridge.* Wigglesworth. Lovering.
" 29. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 29. *New Haven.* Stiles. Loomis.
" 29. *Mannheim.* Koenig. *Sagan.* Preus.
" 29. *The Hague.* Van Swinden. *Laon.* Cotte.[3]
" 30. *Cambridge.* Wigglesworth. Lovering.
" 30. *Cambridge.* Gannett.
" 30. *Mannheim.* Hemmer, &c. *Gurzelen.* Sprüngli.
" 30. *Erfurt.* Planer. *St. Petersburg.* Euler.

[1] Acta Sci. Acad. Petrop. 1783, Pt. II. p. 417.
[2] Trans. Phil. Soc. Phil. II. 196.
[3] Journ. des Savans. 1784, p. 307.

Mar. 30. *Rochelle.* Seignette. *Sagan.* Preus.
" 30. *Dusseldorp.* Phennings. *Berlin.* Beguelin.
" 31. *Rochelle.* Seignette.
Apr. 2. *Cambridge.* Wigglesworth. Lovering.
" 2. *New Haven.* Stiles. Loomis.
" 2. *Mannheim.* Koenig.
" 3. *Cambridge.* Gannett. *Sagan.* Preus.
" 7. *Cambridge.* Wigglesworth. Lovering.
" 7. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 7. *New Haven.* Stiles. Loomis.
" 7. *St. Petersburg.* Euler. *Padua.* Toaldo.
" 7. *Mannheim.* Koenig.
" 7. *Middleburg.* Van de Perre.
" 9. *Berlin.* Beguelin. *Brussels.* Chevalier.[1]
" 11. *Cambridge.* Gannett.
" 12. *Ipswich.* Cutler. *Jena.* Zeissing.
" 12. *Berlin.* Beguelin. *Prague.* Strnad. Hey.
" 12. *Copenhagen.* Bugge. *St. Petersburg.* Euler.
" 14. *Erfurt.* Planer.
" 18. *Berlin.* Beguelin.
" 21. *Sagan.* Preus.
" 22. *Mannheim.* Koenig.
" 24. *New Haven.* Stiles. Loomis.
" 25. *Brussels.* Chevalier. *Sagan.* Preus.
" 26. *Ipswich.* Cutler. *Brussels.* Chevalier.
" 26. *Middleburg.* Van de Perre. *Laon.* Cotte.
" 26. *Mannheim.* Hemmer, &c. Hey.[2]
" 26. *Copenhagen.* Bugge. *St. Petersburg.* Euler.
" 26. *Sagan.* Preus. *Erfurt.* Planer.
" 27. *Cambridge.* Wigglesworth. Lovering.
" 27. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 27. *New Haven.* Stiles. Loomis.
" 27. *Paris.* Bertholon. Boué.
" 27. *Berlin.* Beguelin. *Brussels.* Chevalier.
" 27. *Mannheim.* Hemmer. *Sagan.* Preus.
" 27. *Copenhagen.* Bugge. *Padua.* Toaldo.
" 27. *Prague.* Strnad. *Rochelle.* Seignette.
" 27. *Stockholm.* Nicander. *Dijon.* Maret.
" 27. *Ratisbon.* Heinrich. *Gottingen.* Gatterer.
" 27. *Dusseldorp.* Phennings. *Erfurt.* Planer.
" 27. *Middleburg.* Van de Perre. *Laon.* Cotte.
" 27. *St. Petersburg.* Euler.
" 28. *Prague.* Strnad. *Middleburg.* Van de Perre.
" 29. *Mannheim.* Hemmer, &c.
" 29. *Berlin.* Beguelin. *St. Petersburg.* Euler.
" 29. *Erfurt.* Planer. *Copenhagen.* Bugge.
" 29. *Prague.* Strnad. *Sagan.* Preus.
" 29. *Ratisbon.* Heinrich. *Jena.* Zeissing.

[1] Mém. de l'Acad. Brux. V. 432.
[2] Phil. Trans. LXXX. 32

Apr. 29. *Paris.* Bertholon. Boué.
" 29. *Middleburg.* Van de Perre.
" 29. *Gottingen.* Gatterer. *Laon.* Cotte.
" 30. *Mannheim.* Hemmer. *St. Petersburg.* Euler.
May 1. *Sagan.* Preus. *Jena.* Zeissing.
" 1. *St. Petersburg.* Euler.
" 2. *Cambridge.* Wigglesworth. Lovering.
" 2. *Ipswich.* Cutler. *New Haven.* Stiles. Loomis.
" 2. *Moscow.* Engel.
" 3. *Prague.* Strnad. *Sagan.* Preus.
" 3. *Berlin.* Beguelin.
" 4. *Mannheim.* Hemmer.
" 5. *Mannheim.* Hemmer. *Prague.* Strnad.
" 5. *St. Petersburg.* Euler.
" 12. *Copenhagen.* Bugge. *Laon.* Cotte.
" 12. *Mannheim.* Koenig. *Stockholm.* Nicander.
" 12. *St. Petersburg.* Euler.
" 12. *Brussels.* Chevalier.
" 13. *Cambridge.* Wigglesworth. Lovering.
" 13. *Ipswich.* Cutler.
" 16. *Mannheim.* Hemmer. *Laon.* Cotte.
" 17. *Brussels.* Chevalier.
" 21. *Berlin.* Beguelin. *Copenhagen.* Bugge.
" 22. *Laon.* Cotte.
" 29. *Cambridge.* Wigglesworth. Lovering.
" 29. *Cambridge.* Gannett.
" 29. *Mannheim.* Koenig. *Ratisbon.* Heinrich.
June 1. *New Haven.* Stiles. Loomis. *Padua.* Toaldo.
" 3. *Erfurt.* Planer.
" 13. *Ipswich.* Cutler.
" 29. *Ipswich.* Cutler.
July 2. *Ratisbon?* Heinrich.
" 28. *New Haven.* Stiles. Loomis.
" 30. *Mannheim.* Koenig.
Aug. 1. *Cambridge.* Gannett.
" 1. *New Haven.* Stiles. Loomis.
" 1. *Mannheim.* Hemmer. *Prague.* Strnad.
" 1. *Copenhagen.* Bugge. *Ratisbon.* Heinrich.
" 2. *Ratisbon.* Heinrich.
" 8. *Prague.* Strnad.
" 9. *Ratisbon.* Heinrich.
" 16. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 19. *Cambridge.* Gannett. *Ipswich.* Cutler.
" 24. *Stockholm.* Nicander.
Sept. 15. *Laon.* Cotte.
" 25. *Copenhagen.* Bugge. *Stockholm.* Nicander.
" 25. *Middleburg.* Van de Perre. *Prague.* Strnad.
" 26. *Copenhagen.* Bugge. *Stockholm.* Nicander.
" 26. *Middleburg.* Van de Perre.
" 26. *St. Petersburg.* Euler.

Oct. 22. *Middleburg.* Van de Perre. *Sagan.* Preus.
" 22. *Erfurt.* Planer. *Peissenberg.* Schwaiger.
" 22. *Berlin.* Beguelin. *Buda.* Weiss.
" 22. *St. Petersburg.* Euler. *Laon.* Cotte.
" 23. *Laon.* Cotte.
" 24. *Rochelle.* Seignette.
" 26. *Dijon.* Maret. *Berlin.*[1] Beguelin.
" 27. *Berlin.* Beguelin.
" 29. *Prague.* Strnad. *Laon.* Cotte.
" 30. *Copenhagen.* Bugge.
" 31. *Laon.* Cotte.
Nov. 3. *Mannheim.* Koenig.
" 11. *Mount St. Andex.* Bavaria. Kettel.
" 13. *Mannheim.* Koenig.
" 14. *Laon.* Cotte.
" 15. *Dijon.* Maret.
" 26. *Jena.* Zeissing.
Dec. 4. *Mannheim.* Koenig.
" 17. *Berlin.* Beguelin.
" 18. *Prague.* Strnad.

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Jan. 10. *Prague.* Strnad.
" 11. *Padua.* Toaldo and Chiminello.
" 20. *Rochelle.* Seignette.
" 21. *Rochelle.* Seignette.
" 28. *Spydberg, Norway.* Wilse.
" 29. *Stockholm.* Nicander.
Feb. 22. *Copenhagen.* Bugge.
" 23. ———— Cavendish. Thompson.[3]
" 24. *Stockholm.* Nicander.
Mar. 5. *Mannheim.* Koenig.
" 12. *Ratisbon?* Heinrich.
" 13. *Mannheim?* Hemmer.
" 14. *Mannheim.* Hemmer.
" 15. *Sagan.* Preus.
" 18. *Sagan.* Preus.
" 19. *Spydberg.* Wilse.
" 20. *Spydberg.* Wilse.
" 29. *St. Petersburg.* Euler.[3]
" 30. *Spydberg.* Wilse.
Apr. 8. *St. Petersburg.* Euler.
" 8. *Spydberg.* Wiles.
" 9. *Ratisbon?* Heinrich. *Spydberg.* Wilse.
" 15. *Berlin.* Beguelin.[4]
" 16. *Berlin.* Beguelin.

[1] Aurora Australis.
[2] Phil. Trans. LXXX. 101.
[3] Acta Sci. Acad. Petrop. 1767. Pt. II. p. 303.
[4] Not in the Berlin Memoirs, but in Ephem. Soc. Met. Palat.

Apr. 18. *Berlin.* Beguelin.
" 21. *Padua.* Toaldo and Chiminello.
" 24. *Spydberg.* Wilse.
May 5. *Spydberg.* Wilse.
" 6. *Peissenberg.* Schwaiger.
" 9. *Laon.* Cotte.[1]
" 17. *Erfurt.* Planer. *Jena.* Zeissing.
" 17. *Laon.* Cotte.
June 11. *Cambridge.* Wigglesworth. Lovering.
" 16. *Rochelle.* Seignette.
" 17. *Rochelle.* Seignette.
" 21. *Ratisbon.* Heinrich.
" 30. *St. Veran.* Roberjot.[2]
July 1. *St. Veran.* Roberjot.
" 3. *Delphi?* Van Swinden.
" 24. *Berlin.* Beguelin.
" 25. *Mannheim.* Hemmer. *Laon.* Cotte.
" 25. *Copenhagen.* Bugge. *Padua.* Toaldo.
" 26. *Mannheim.* Hemmer.
Aug. 4. *Prague.* Strnad.
" 5. *Berlin.* Beguelin.
" 12. *Stockholm.* Nicander.
" 12. *St. Petersburg.* Euler.
" 15. *Berlin.* Beguelin.
" 21. *Stockholm.* Nicander.
" 21. *St. Petersburg.* Euler.
" 30. *St. Petersburg.* Euler.
Sept. 5. *Stockholm.* Nicander.
" 6. *Sagan.* Preus.
" 8. *Mannheim.* Koenig.
" 11. *Sagan.* Preus.
" 12. *Sagan.* Preus.
" 15. *Cambridge.* Wigglesworth. Lovering.
" 15. *Jena.* Zeissing. *Mannheim.* Koenig.
" 15. *Copenhagen.* Bugge. *Prague.* Strnad.
" 15. *Middleburg.* Van de Perre. *Sagan.* Preus.
" 15. *Stockholm.* Nicander. *Spydberg.* Wilse.
" 15. *Delphi?* Van Swinden. *Laon.* Cotte.
Oct. 4. *Rochelle.* Seignette.
" 6. *Spydberg.* Wilse. *Stockholm.* Nicander.
" 7. *Spydberg.* Wilse.
" 11. *Spydberg.* Wilse.
" 13. *Spydberg.* Wilse.
" 14. *Spydberg.* Wilse.
Nov. 13. *Cuba.* Poey.
" 15. *Cambridge.* Wigglesworth. Lovering.
" 15. *New Haven.* Stiles. Loomis.

[1] Journ. des Savans, 1785, p. 243.
[2] Journ. de Phys. XXIV. 399.

Nov. 15. *Jena.* Zeissing. *Prague.* Strnad.
" 15. *Ratisbon.* Heinrich. *Sagan.* Preus.
" 15. *Dusseldorp.* Phennings. *Dijon.* Maret.
" 15. *Peissenberg.* Schwaiger. *Erfurt.* Planer.
" 15. *Munich.* Huebpauer. *Würzburg.* Egel.
" 15. *Mannheim.* Hemmer, &c. *Padua.* Toaldo.
" 15. *Mount St. Andex, Bavaria.* Kettel.
" 19. *Spydberg.* Wilse. *Berlin.* Beguelin.
" 15. *Laon.* Cotte.
Dec. 6. *St. Petersburg.* Euler.
" 11. *Cambridge.* Wigglesworth. Lovering.
" 11. *Spydberg.* Wilse.
" 12. *Spydberg.* Wilse.
" 20. *Spydberg.* Wilse.
" 29. *St. Petersburg.* Euler.
" 31. *Sagan.* Preus.

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Jan. 1. *Spydberg.* Wilse. *Stockholm.* Nicander.
" 17. *Berlin.* Beguelin.[1]
" 26. *Tigurina Aedes.* Gothard.
" 28. *Tigurina Aedes.* Gothard.
" 29. *St. Petersburg.* Euler.[2]
Feb. 3. *Tigurina Aedes.* Gothard.
" 7. *Cambridge.* Williams.
" 16. *Mannheim.* Hemmer.
" 17. *Mannheim.* Hemmer.
" 22. *Mannheim.* Hemmer.
" 23. *Cambridge.* Williams.
" 28. *Stockholm.* Nicander.
Mar. 4. *Spydberg.* Wilse.
" 5. *Spydberg.* Wilse.
" 6. *St. Petersburg.* Euler. *Sagan?* Preus.
" 6. *Stockholm.* Nicander. *Spydberg.* Wilse.
" 19. *St. Petersburg.* Euler.
" 22. *Paris.* Cassini.[3]
Apr. 3. *Brussels.* Mann.[4]
" 4. *Stockholm.* Nicander.
" 7. *St. Petersburg.* Euler.
" 12. *Cambridge.* Williams. *Mannheim.* Hemmer.
" 18. *Stockholm.* Nicander.
" 26. *St. Petersburg.* Euler.
" 27. *Mannheim?* Hemmer.
" 29. *Berlin.* Beguelin.[5] *Rochelle.* Seignette.

[1] Ephem. Soc. Met. Palat.
[2] Acta Sci. Acad. Petrop. 1785. Pt. II. p. 322.
[3] Mém. de l'Acad. 1784.
[4] Mém de l'Acad. Brux. V. 438.
[5] Ephem. Soc. Met. Palat.

Apr. 30. *Stockholm.* Nicander.
May 1. *Cambridge.* Williams. *Brussels.* Mann.
" 9. *Cambridge.* Wigglesworth. Lovering.
" 9. *New Haven.* Stiles. Loomis.
" 15. *Brussels.* Mann.
" 23. *Spydberg.* Wilse. *Paris.* Cassini.
June 5. *New Haven.* Stiles. Loomis.
" 14. *Cambridge.* Williams.
" 28. *Mannheim.* Koenig and Hemmer.[1]
July 3. *New Haven.* Stiles. Loomis.
" 4. *Brussels.* Mann.
" 17. *Cambridge.* Williams. *Brussels.* Mann.
" 24. *Mannheim.* Hemmer.
" 24. *Copenhagen.* Bugge.
" 24. *St. Petersburg.* Euler.[2]
Aug. 3. *Brussels.* Mann.
" 9. *New Haven.* Stiles. Loomis. *Padua.* Toaldo.
" 9. *Berlin.* Beguelin. *St. Petersburg.* Euler.
" 11. *Brussels.* Mann.
" 30. *Mannheim.* Hemmer.
" 31. *Middleburg.* Van de Perre.
Sept. 1. *Stockholm.* Nicander.
" 3. *Stockholm.* Nicander.
" 8. *Cambridge.* Wigglesworth. Lovering.
" 8. *Cambridge.* Williams.
" 8. *New Haven.* Stiles. Loomis.
" 8. *Spydberg.* Wilse. *St. Petersburg.* Euler.
" 9. *Spydberg.* Wilse. *Stockholm.* Nicander.
" 11. *St. Petersburg.* Euler.
" 12. *St. Petersburg.* Euler.
" 13. *Brussels.* Mann.
" 14. *St. Petersburg.* Euler.
" 23. *Mannheim.* Hemmer.
" 28. *Stockholm.* Nicander.
" 29. *Spydberg.* Wilse. *Stockholm.* Nicander.
Oct. 3. *Stockholm.* Nicander.
" 4. *Sagan.* Preus. *Stockholm.* Nicander.
" 4. *St. Petersburg.* Euler.
" 5. *Mannheim.* Koenig. *Jena.* Zeissing.
" 5. *Moscow.* Stritter. *Stockholm.* Nicander.
" 5. *St. Petersburg.* Euler.
" 6. *Cambridge.* Wigglesworth. Lovering.
" 5. *Cambridge.* Williams.
" 6. *Middleburg.* Van de Perre.
" 8. *Cambridge.* Williams.
" 9. *Stockholm.* Nicander.
" 9. *St. Petersburg.* Euler.

[1] Aurora Borealis et Australis.
[2] Ephem. Soc. Met. Palat.

Oct. 22. *Rochelle.* Seignette.
" 27. *Spydberg.* Wilse.
Nov. 2. *St. Petersburg.* Euler. *Laon.* Cotte.[1]
" 2. *Berlin.* Beguelin. *Erfurt.* Planer.
" 2. *Sagan.* Preus. *Brussels.* Mann.
" 5. *Mannheim.* Koenig. *Brussels.* Mann.
" 6. *Sagan?* Preus. *Laon.* Cotte.
" 28. *Stockholm.* Nicander.
" 29. *Cambridge.* Wigglesworth. Lovering.
" 29. *New Haven.* Stiles. Loomis.
" 29. *Mannheim.* Koenig. *Stockholm.* Nicander.
" 29. *Berlin.* Beguelin. *Sagan?* Preus.
" 30. *Cambridge.* Wigglesworth. Lovering.
Dec. 6. *Stockholm.* Nicander.
" 13. *Mannheim.* Hemmer.
" 19. *Cambridge.* Wigglesworth. Lovering.
" 19. *Berlin.* Beguelin.
" 25. *Spydberg.* Wilse.
" 26. *Spydberg.* Wilse.
" 28. *Spydberg.* Wilse.
" 29. *Stockholm.* Nicander.
" 30. *Copenhagen.* Bugge.

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Jan. 4. *Prague.* Strnad. *Sagan?* Preus.
" 14. *Mannheim.* Hemmer.
" 18. *Brussels.* Mann.
" 29. ——— Lowenorn.[2]
" 30. *Tigurina Aedes.* Gothard.
Feb. 3. *St. Petersburg.* Euler.[3]
" 3. *Stockholm.* Nicander. *Spydberg.* Wilse.
" 16. *Cambridge.* Williams.
" 16. *Salem.* Holyoke. Lovering.
" 16. *Stockholm.* Nicander.
" 17. *Berlin.* Beguelin. *Sagan?* Preus.
" 17. *Spydberg.* Wilse.
" 20. *Berlin.* Beguelin.
" 21. *Stockholm.* Nicander.
" 27. *St. Petersburg.* Euler.
" 28. *Cambridge.* Wigglesworth. Lovering.
" 28. *Cambridge.* Williams.
" 28. *Salem.* Holyoke. Lovering. *Spydberg.* Wilse.
" 28. *New Haven.* Stiles. Loomis.
" 28. *Berlin.* Beguelin. *Copenhagen.* Bugge.
" 28. *St. Petersburg.* Euler. *Brussels.* Mann.[4]
" 1. *St. Petersburg.* Euler.

[1] Journ. des Savans, 1786, p. 112.
[2] Thompson's Met. p. 349.
[3] Acta Soc. Acad. Petrop. 1786. Pt. II. p. 321.
[4] Mém. de l'Acad. Brux. V. 445.

Mar. 2. *St. Petersburg.* Euler.
" 2. *Stockholm.* Nicander. *Spydberg.* Wilse.
" 3. *St. Petersburg.* Euler.
" 3. *Stockholm.* Nicander. *Spydberg.* Wilse.
" 4. *St. Petersburg.* Euler.
" 4. *Stockholm.* Nicander.
" 11. *St. Petersburg.* Euler.
" 13. *Cambridge.* Wigglesworth. Lovering.
" 13. *Cambridge.* Williams.
" 13. *New Haven.* Stiles. Loomis.
" 16. *St. Petersburg.* Euler.
" 17. *Stockholm.* Nicander.
" 18. *St. Petersburg.* Euler.
" 18. *Stockholm.* Nicander. *Spydberg.* Wilse.
" 19. *Cambridge.* Wigglesworth. Lovering.
" 19. *Cambridge.* Williams.
" 19. *Salem.* Holyoke. Lovering.
" 19. *New Haven.* Stiles. Loomis.
" 19. *Moscow.* Stritter. *Paris.* Cassini.[1]
" 19 *St. Petersburg.* Euler. *Prague.* Strnad.
" 19. *Stockholm.* Nicander. *Spydberg.* Wilse.
" 20. *New Haven.* Stiles. Loomis.
" 20. *Erfurt.* Planer. *Moscow.* Stritter.
" 20. *St. Petersburg.* Euler. *Berlin.* Beguelin.
" 21. *Salem.* Holyoke. Lovering.
" 21. *New Haven.* Stiles. Loomis. *Sagan?* Preus.
" 22. *Cambridge.* Wigglesworth. Lovering.
" 22. *Cambridge.* Williams.
" 22. *New Haven.* Stiles. Loomis. *Sutz.* Sprüngli.
" 22. *Brussels.* Mann. *Ratisbon.* Heinrich.
" 22. *Marseilles.* St. Jacques. *Padua.* Toaldo.
" 22. *Peissenberg.* Schwaiger. *Berne.* Studer.
" 22. *Prague.* Strnad. *Sagan?* Preus.
" 23. *New Haven.* Stiles. Loomis.
" 23. *Mount St. Andex.* Kettel. *Buda.* Bruna.
" 23. *Munich.* Huebpauer. *Sagan?* Preus.
" 23. *Rome.* Calandrelli. *Stockholm.* Nicander.
" 25. *Cambridge.* Wigglesworth. Lovering.
" 35. *Salem.* Holyoke. Lovering.
" 25. *Berlin.* Beguelin. *Mannheim.* Hemmer.
" 25. *Marseilles.* St. Jacques.
" 27. *Cambridge.* Wigglesworth. Lovering.
" 27. *Cambridge.* Williams.
" 27. *Salem.* Holyoke. Lovering.
" 27. *New Haven.* Stiles. Loomis.
" 28. *Mannheim.* Hemmer.
" 29. *St. Petersburg.* Euler. *Moscow.* Stritter.
" 29. *Marseilles.* St. Jacques. *Sagan?* Preus.

[1] Mém. de l'Acad. 1786.

Mar. 29. *Spydberg.* Wilse. *Berne.* Studer.
" 30. *Cambridge.* Wigglesworth. Lovering.
" 30. *Cambridge.* Williams.
" 30. *Salem.* Holyoke. Lovering.
" 30. *St. Petersburg.* Euler. *Spydberg.* Wilse.
" 30. *Stockholm.* Nicander.
" 31. *Cambridge.* Wigglesworth. Lovering.
" 31. *Cambridge.* Williams.
" 31. *Salem.* Holyoke. Lovering.
" 31. *Stockholm.* Nicander. *Sagan.* Preus.
" 31. *St. Petersburg.* Euler.
Apr. 1. *Stockholm.* Nicander.
" 1. *St. Petersburg.* Euler.
" 2. *Cambridge.* Williams.
" 2. *Salem.* Holyoke. Lovering.
" 2. *St. Petersburg.* Euler.
" 2. *Stockholm.* Nicander.
" 2. *Berlin.* Beguelin. *Sagan?* Preus.
" 2. *Copenhagen.* Bugge.
" 3. *Brussels.* Mann.
" 6. *Cambridge.* Williams.
" 6. *Salem.* Holyoke. Lovering.
" 7. *Stockholm.* Nicander.
" 11. *Cambridge.* Williams.
" 11. *Salem.* Holyoke. Lovering.
" 11. *New Haven.* Stiles. Loomis.
" 11. *Stockholm.* Nicander.
" 12. *St. Petersburg.* Euler.
" 15. *Stockholm.* Nicander.
" 18. *St. Petersburg.* Euler. *Jena.* Zeissing.
" 18. *Berlin.* Beguelin. *Delphi.* Van Swinden.
" 18. *Ratisbon.* Heinrich. *Sagan.* Preus.
" 18. *Brussels.* Mann. *Stockholm.* Nicander.
" 18. *Erfurt.* Planer. *Padua.* Toaldo.
" 18. *Copenhagen.* Bugge.
" 19. *Sagan?* Preus.
" 20. *Mannheim.* Hemmer. *Sagan?* Preus.
" 20. *Sagan.* Preus. *Brussels.* Mann.
" 21. *Stockholm.* Nicander.
" 21. *St. Petersburg.* Euler. *Sagan.* Preus.
" 22. *St. Petersburg.* Euler. *Copenhagen.* Bugge.
" 22. *Sagan.* Preus. *Ratisbon.* Heinrich.
" 22. *Stockholm.* Nicander. *Mannheim.* Hemmer.
" 22. *Berlin.* Beguelin. *Würzburg.* Egel.
" 22. *Spydberg.* Wilse.
" 23. *Stockholm.* Nicander. *Brussels.* Mann.
" 23. *Mannheim.* Hemmer. *Sagan?* Preus.
" 24. *Berlin.* Beguelin. *Sagan.* Preus.
" 24. *Stockholm.* Nicander.
" 25. *Berlin.* Beguelin. *Sagan?* Preus.
Apr. 26. *Cambridge.* Wigglesworth. Lovering.
" 26. *Cambridge.* Williams.
" 26. *New Haven.* Stiles. Loomis.
" 26. *Stockholm.* Nicander.
" 26. *St. Petersburg.* Euler. *Berlin.* Beguelin.
" 26. *Prague.* Strnad. *Sagan?* Preus.
" 27. *Cambridge.* Williams. *Sagan?* Preus.
" 27. *St. Petersburg.* Euler.
" 27. *Stockholm.* Nicander.
" 28. *Cambridge.* Wigglesworth. Lovering.
" 28. *Cambridge.* Williams.
" 28. *Salem.* Holyoke. Lovering.
" 29. *Cambridge.* Wigglesworth. Lovering.
" 29. *Cambridge.* Williams.
" 29. *Salem.* Holyoke. Lovering.
" 29. *Delphi.* Van Swinden. *Sagan.* Preus.
" 29. *Brussels.* Mann. *Prague.* Strnad.
" 29. *Stockholm.* Nicander. *Ratisbon.* Heinrich.
" 30. *Stockholm.* Nicander. *Delphi.* Van Swinden.
May 1. *New Haven.* Stiles. Loomis.
" 1. *Berlin.* Beguelin. *Kendal.* Dalton.[2]
" 1. *Paris.* Cassini. *Brussels.* Mann.
" 2. *Copenhagen.* Bugge. *Delphi.* Van Swinden.
" 2. *St. Petersburg.* Euler.
" 2. *Stockholm.* Nicander.
" 2. *Berlin.* Beguelin. *Brussels.* Mann.
" 3. *Berlin.* Beguelin. *Brussels.* Mann.
" 4. *Berlin.* Beguelin.
" 5. *Brussels.* Mann.
" 8. *Berlin.* Beguelin.
" 11. *Kendal.* Dalton. *Berlin.* Beguelin.
" 12. *Brussels.* Mann.
" 14. *Berlin.* Beguelin. *Paris.* Cassini.
" 15. *Berlin.* Beguelin.
" 15. *Prague.* Strnad. *Brussels.* Mann.
" 16. *Brussels.* Mann.
" 17. *Brussels.* Mann.
" 18. *Berlin.* Beguelin. *Brussels.* Mann.
" 19. *New Haven.* Stiles. Loomis.
" 19. *Brussels.* Mann.
" 20. *Brussels.* Mann.
" 22. *New Haven.* Stiles. Loomis.
" 22. *Berlin.* Beguelin. *Kendal.* Dalton.
" 22. *Rome.* Calandrelli. *Brussels.* Mann.
" 23. *Salem.* Holyoke. Lovering.
" 24. *Berlin.* Beguelin. *Padua.* Toaldo.
" 30. *Sagan.* Preus.
" 31. *Cambridge.* Wigglesworth. Lovering.

[1] Meter. Observ. and Essays, p. 54.

May 30. *Montmorenci.* Cotte.
" 31. *Cambridge.* Williams.
" 31. *Salem.* Holyoke. Lovering.
" 31. *Paris.* Cassini. *Berlin.* Beguelin.[1]
" 31. *Montmorenci.* Cotte.
" 31. *Delphi.* Van Swinden.
June 1. *Salem.* Holyoke. Lovering.
" 1. *Delphi.* Van Swinden.
" 4. *Montmorenci.* Cotte.
" 5. *Mannheim?* Hemmer.
" 19. *Salem.* Holyoke. Lovering.
" 19. *New Haven.* Stiles. Loomis.
" 28. *Delphi.* Van Swinden.
" 30. *Cambridge.* Wigglesworth. Lovering.
" 30. *Cambridge.* Williams.
" 30. *Salem.* Holyoke. Lovering.
" 30. *New Haven.* Stiles. Loomis. *Brussels.* Mann.
July 1. *Cambridge.* Wigglesworth. Lovering.
" 1. *Cambridge.* Williams.
" 1. *Salem.* Holyoke. Lovering.
" 1. *New Haven.* Stiles. Loomis.
" 2. *Cambridge.* Wigglesworth. Lovering.
" 2. *Cambridge.* Williams.
" 2. *Salem.* Holyoke. Lovering.
" 2. *New Haven.* Stiles. Loomis.
" 5. *Cambridge.* Wigglesworth. Lovering.
" 5. *Cambridge.* Williams.
" 5. *Salem.* Holyoke. Lovering. *Paris.* Cassini.
" 15. *Cambridge.* Wigglesworth. Lovering.
" 15. *Cambridge.* Williams.
" 15. *Salem.* Holyoke. Lovering.
" 15. *Kendal.* Dalton. *Copenhagen.* Bugge.
" 16. *Cambridge.* Williams.
" 17. *Salem.* Holyoke. Lovering.
" 18. *Berlin.* Beguelin.
" 19. *Cambridge.* Wigglesworth. Lovering.
" 19. *Cambridge.* Williams.
" 20. *Salem.* Holyoke. Lovering. *Brussels.* Mann.
" 22. *Brussels.* Mann.
" 24. *Berlin.* Beguelin. *Brussels.* Mann.
" 25. *Montmorenci.* Cotte.
" 27. *Cambridge.* Wigglesworth. Lovering.
" 27. *Cambridge.* Williams.
" 27. *Salem.* Holyoke. Lovering.
" 29. *Prague.* Strnad.
Aug. 2. *Brussels.* Mann.
" 3. *Salem.* Holyoke. Lovering. *Brussels.* Mann.

[1] This and the aurora of May 24th are not mentioned in the Berlin Memoirs; but in the Ephem. Soc. Met. Palat.

Aug. 11. *Kendal.* Dalton.
" 16. *Brussels.* Mann.
" 17. *Kendal.* Dalton.
" 18. *New Haven.* Stiles. Loomis.
" 18. *Montmorenci.* Cotte.
" 18. *Brussels.* Mann. *St. Petersburg.* Euler.
" 19. *Brussels.* Mann.
" 21. *Mannheim.* Hemmer. *Brussels.* Mann.
" 22. *Cambridge.* Wigglesworth. Lovering.
" 22. *Cambridge.* Williams.
" 22. *Salem.* Holyoke. Lovering.
" 22. *New Haven.* Stiles. Loomis.
" 22. *St. Petersburg.* Euler. *Mannheim.* Hemmer.
" 24. *New Haven.* Stiles. Loomis.
" 25. *Cambridge.* Wigglesworth. Lovering.
" 25. *Cambridge.* Williams.
" 25. *Salem.* Holyoke. Loomis.
" 25. *St. Petersburg.* Euler.
" 25. *Stockholm.* Nicander.
" 31. *Salem.* Holyoke. Lovering.
" 31. *Stockholm.* Nicander.
Sept. 2. *St. Petersburg.* Euler.[1]
" 3. *Salem.* Holyoke. Lovering.
" 3. *Mannheim.* Hemmer.
" 5. *Mannheim.* Hemmer.
" 8. *Kendal.* Dalton. *St. Petersburg,* Euler.
" 14. *St. Petersburg.* Euler.
" 17. *St. Petersburg.* Euler.
" 19. *Mannheim.* Hemmer. *Berlin.* Beguelin.
" 19. *Stockholm.* Nicander. *Paris.* Cassini.
" 18. *Kendal.* Dalton. *Delphi.* Van Swinden.
" 18. *Montmorenci.* Cotte.
" 20. *Kendal.* Dalton. *Sagan?* Preus.
" 20. *Stockholm.* Nicander.
" 21. *Kendal.* Dalton.
" 22. *Stockholm.* Nicander.
" 23. *Stockholm.* Nicander.
" 24. *Stockholm.* Nicander.
" 26. *Kendal.* Dalton.
" 28. *Cambridge.* Wigglesworth. Lovering.
" 28. *Cambridge.* Williams.
" 28. *Salem.* Holyoke. Lovering.
" 29. *Cambridge.* Wigglesworth. Lovering.
" 29. *Cambridge.* Williams.
" 29. *Salem.* Holyoke. Lovering. *Kendal.* Dalton.
" 29. *Copenhagen.* Bugge.
" 30. *Stockholm.* Nicander. *Spydberg.* Wilse.
Oct. 1. *St. Petersburg.* Euler. *Spydberg.* Wilse.

[1] Ephem. Soc. Met. Pal.

Oct. 2. *Rome.* Calandrelli. *St. Petersburg.* Euler.
" 2. *Spydberg.* Wilse.
" 3. *Spydberg.* Wilse.
" 10. *Mannheim.* Hemmer.
" 12. *Sagan.* Preus.
" 13. *Cambridge.* Wigglesworth. Lovering.
" 13. *Cambridge.* Williams.
" 13. *Salem.* Holyoke. Lovering.
" 13. *Kendal.* Dalton. *Paris.* Cassini.
" 13. *Delphi.* Van Swinden. *Padua.* Toaldo.
" 13. *Mannheim.* Hemmer. *Erfurt.* Planer.
" 13. *Sagan?* Preus. Stockholm. Nicander.
" 13. *St. Petersburg.* Euler.
" 13. *Copenhagen.* Bugge. *Montmorenci.* Cotte.
" 14. *Mannheim.* Hemmer. *Padua.* Toaldo.
" 16. *New Haven.* Stiles. Loomis.
" 16. *Mannheim.* Hemmer.
" 17. *Cambridge.* Wigglesworth. Lovering.
" 17. *Cambridge.* Williams.
" 17. *Salem.* Holyoke. Lovering.
" 17. *Spydberg.* Wilse.
" 17. *New Haven.* Stiles. Loomis.
" 17. *Mannheim.* Hemmer. *Stockholm.* Nicander.
" 17. *Brussels.* Mann. *Montmorenci.* Cotte.
" 17. *Middleburg.* Van de Perre.
" 17. *Delphi.* Van Swinden. *Sagan.* Preus.
" 18. *Brussels.* Mann. *Spydberg.* Wilse.
" 19. *Spydberg.* Wilse.
" 20. *St. Petersburg.* Euler. *Spydberg.* Wilse.
" 21. *Gothaab, Greenland.* Ginge.[1]
" 22. *Sagan?* Preus.
" 23. *Sagan?* Preus. *Gothaab.* Ginge.
" 23. *Stockholm.* Nicander.
" 25. *Cambridge.* Wigglesworth. Lovering.
" 25. *Cambridge.* Williams.
" 25. *Salem.* Holyoke. Lovering. *Padua.* Toaldo.
" 25. *Kendal.* Dalton. *Jena.* Zeissing.
" 25. *Berlin.* Beguelin. *St. Petersburg.* Euler.
" 25. *Prague.* Strnad. *Stockholm.* Nicander.
" 26. *Stockholm.* Nicander. *Spydberg.* Wilse.
" 27. *Salem.* Holyoke. Lovering.
" 27. *Spydberg.* Wilse. *Gothaab.* Ginge.
" 28. *Sagan.* Preus. *Gothaab.* Ginge.
" 28. *Spydberg.* Wilse.
Nov. 8. *Paris.* Cassini.
" 10. *Gothaab.* Ginge.
" 11. *Stockholm.* Nicander.
" 12. *Mannheim.* Hemmer. *Stockholm.* Nicander.

[1] Ephem. Soc. Met. Palat. VII.

Nov. 12. *St. Petersburg.* Euler.
" 13. *New Haven.* Stiles. Loomis.
" 13. *Spydberg.* Wilse.
" 14. *Kendal.* Dalton. *Gothaab.* Ginge.
" 14. *Copenhagen.* Bugge. *Spydberg.* Wilse.
" 15. *Salem.* Holyoke. Lovering.
" 15. *New Haven.* Stiles. Loomis. *Gothaab.* Ginge.
" 16. *Cambridge.* Wigglesworth. Lovering.
" 16. *Cambridge.* Williams.
" 16. *St. Petersburg.* Euler. *Gothaab.* Ginge.
" 16. *Stockholm.* Nicander. *Spydberg.* Wilse.
" 17. *Gothaab.* Ginge. *Spydberg.* Wilse.
" 18. *Salem.* Holyoke. Lovering.
" 18. *Gothaab.* Ginge. *Spydberg.* Wilse.
" 19. *Gothaab.* Ginge.
" 20. *Mannheim.* Hemmer. *Gothaab.* Ginge.
" 20. *St. Petersburg.* Euler.
" 21. *Cambridge.* Wigglesworth. Lovering.
" 21. *Cambridge.* Williams.
" 21. *Salem.* Holyoke. Lovering. *Gothaab.* Ginge.
" 22. *Gothaab.* Ginge.
" 28. *Gothaab.* Ginge.
" 29. *Gothaab.* Ginge.
Dec.[1] 3. *Mannheim.* Hemmer.
" 5. *Salem.* Holyoke. Lovering. *Brussels.* Mann.
" 7. *Gothaab.* Ginge.
" 8. *Gothaab.* Ginge.
" 10. *Gothaab.* Ginge.
" 11. *Gothaab.* Ginge.
" 12. *Gothaab.* Ginge.[2]
" 13. *Gothaab.* Ginge. *St. Petersburg.* Euler.
" 14. *Gothaab.* Ginge.
" 15. *Salem.* Holyoke. Lovering.
" 15. *Gothaab.* Ginge. *St. Petersburg.* Euler.
" 18. *Brussels.* Mann.
" 20. *Middleburg.* Van de Perre.
" 22. *Stockholm.* Nicander.
" 24. *Stockholm.* Nicander. *Gothaab.* Ginge.
" 25. *Stockholm.* Nicander.
" 25. *Gothaab.* Ginge. *Kendal.* Dalton.
" 26. *Gothaab.* Ginge.
" 31. *Stockholm.* Nicander.

1787.

Jan. 2. *Stockholm.* Nicander.
" 7. *Stockholm.* Nicander. *Mannheim.* Hemmer.

[1] There were thirty auroras seen in Greenland in November and December, and sixteen in the following January. Ephem. Soc. Met. Palat. VII.

[2] Schweigg. Jahr. XVI. 289. Edin. Phil. Journ. XII. 84.

Jan. 7. *Edsberg.* *Norway.* Wilse.
" 8. *Edsberg.* Wilse. *Stockholm.* Nicander.
" 9. *Rochelle.* Seignette. *Stockholm.* Nicander.
" 10. *Edsberg.* Wilse. *Gothaab.* Ginge.
" 11. *Edsberg.* Wilse. *Gothaab.* Ginge.
" 11. *Stockholm.* Nicander.
" 12. *Kendal.* Dalton. *Gothaab.* Ginge.
" 13. *Gothaab.* Ginge. *Stockholm.* Nicander.
" 14. *Gothaab.* Ginge. *Stockholm.* Nicander.
" 15. *Gothaab.* Ginge.
" 16. *Salem.* Holyoke. Lovering. *Gothaab.* Ginge.
" 17. *Cambridge.* Wigglesworth. Lovering.
" 17. *Cambridge.* Williams.
" 18. *Gothaab.* Ginge.
" 19. *Gothaab.* Ginge.
" 20. *Gothaab.* Ginge.
" 21. *Gothaab.* Ginge. *Sagan.* Preus.
" 21. *Mannheim.* Hemmer.
" 22. *Edsberg.* Wilse. *Mannheim.* Hemmer.
" 22. *Sagan.* Preus. *Bologna.* Matteucci.
" 22. *Prague.* Strnad. *Erfurt.* Planer.
" 22. *Montmorenci.* Cotte.
" 22. *Gottingen.* Gatterer. *Stockholm.* Nicander.
" 22. *Montmorenci.* Cotte.
" 23. *Gothaab.* Ginge.
" 24. *Kendal.* Dalton. *Stockholm.* Nicander.
" 25. *Kendal.* Dalton. *Paris.* Cassini.[1]
" 25. *Copenhagen.* Bugge. *Stockholm.* Nicander
" 27. *Gothaab.* Ginge. *Prague.* Strnad.
" 27. *Edsberg.* Wilse.
" 28. *Gothaab.* Ginge.
" 29. *Mannheim.* Hemmer.
Feb. 3. *St. Petersburg.* Euler.[2]
" 3. *Stockholm.* Nicander.
" 4. *St. Petersburg.* Euler.
" 6. *Salem.* Holyoke. Lovering.
" 8. *Edsberg.* Wilse.
" 9. *Salem.* Holyoke. Lovering.
" 9. *Stockholm.* Nicander.
" 12. *Cambridge.* Williams. *Gothaab.* Ginge.
" 14. *Gothaab.* Ginge. *Ratisbon.* Heinrich.
" 15. *Cambridge.* Wigglesworth. Lovering.
" 15. *Cambridge.* Williams.
" 15. *Salem.* Holyoke. Lovering.
" 15. *Paris.* Cassini. *Stockholm.* Nicander.
" 15. *Padua.* Toaldo. *Bologna.* Matteucci.
" 16. *Gothaab.* Ginge. *Würzburg.* Egel.
" 17. *Würzburg.* Egel. *Stockholm.* Nicander.

[1] Mém. de l'Acad. 1787. p. 19.
[2] Nova Acta Soc. Acad. Petrop. V. 96 et 320.

Feb. 18. *Gothaab.* Ginge. *Sagan.* Preus.
" 19. *Gothaab.* Ginge.
" 20. *Salem.* Holyoke. Lovering.
" 20. *Edsberg.* Wilse. *Copenhagen.* Bugge.
" 21. *Edsberg.* Wilse. *Copenhagen.* Bugge.
" 21. *Stockholm.* Nicander.
" 22. *Salem.* Holyoke. Lovering. *Kendal.* Dalton
" 22. *Edsberg.* Wilse. *Gottingen.* Gatterer.
" 24. *Stockholm.* Nicander.
" 25. *Berlin.* Beguelin. *Mannheim.* Hemmer.
" 25. *Prague.* Strnad.
" 27. *Prague.* Strnad.
Mar. 6. *Mannheim.* Hemmer. *Stockholm.* Nicander.
" 7. *St. Petersburg.* Euler. *Stockholm.* Nicander.
" 10. *Moscow.* Stritter. *Gothaab.* Ginge.
" 12. *Stockholm.* Nicander.
" 13. *Ronneburg.* Dietmann. Boué.[1]
" 14. *Gothaab.* Ginge.
" 16. *Edsberg.* Wilse. *Mannheim.* Hemmer.
" 16. *Sagan.* Preus.
" 17. *Mannheim.* Hemmer. *Gothaab.* Ginge.
" 18. *Edsberg.* Wilse. *Paris.* Cassini.
" 18. *St. Petersburg.* Euler.
" 18. *Stockholm.* Nicander.
" 18. *Mannheim.* Hemmer. *Gothaab.* Ginge.
" 18. *Sagan.* Preus. *Munich.* Huebpauer.
" 18. *Buda.* Bruna. *Copenhagen.* Bugge.
" 19. *Gothaab.* Ginge. *Peissenberg.* Schwaiger.
" 20. *Cambridge.* Wigglesworth. Lovering.
" 20. *Cambridge.* Williams.
" 20. *Salem.* Holyoke. Lovering.
" 20. *New Haven.* Stiles. Loomis.
" 20. *Brussels.* Mann.[2] *Paris.* Cassini.
" 20. *Gothaab.* Ginge.
" 21. *Cambridge.* Wigglesworth. Lovering.
" 21. *Cambridge.* Williams.
" 21. *New Haven.* Stiles. Loomis.
" 21. *Edsberg.* Wilse. *Paris.* Cassini.
" 21. *Mannheim.* Hemmer. *Brussels.* Mann.
" 21. *Kendal.* Dalton. *Geneva.* Senebier.
" 21. *Erfurt.* Planer. *Ratisbon.* Heinrich.
" 21. *Stockholm.* Nicander. *Gottingen.* Gatterer.
" 21. *St. Petersburg.* Euler. *Copenhagen* Bugge.
" 21. *Peissenberg.* Schwaiger. *Berne.* Studer.
" 21. *Rochelle.* Seignette. *Sutz.* Sprüngli.

[1] Sitz. Bericht. Wien. XLV. 445.
[2] The observations at Brussels for 1787 do not appear to have been published in full either in the Mém. de l'Acad. Brux., or the Ephem. Soc. Met. Palat. There were thirty-three in all. Mém. de l'Acad. Brux. V. 457.

Mar. 21. *Munich.* Huebpauer. *Sagan.* Preus.
" 22. *Edsberg.* Wilse. *Ratisbon.* Heinrich.
" 23. *Cambridge.* Williams.
" 23. *Salem.* Holyoke. Lovering.
" 23. *New Haven.* Stiles. Loomis.
" 23. *Stockholm.* Nicander.
" 24. *Stockholm.* Nicander.
" 24. *Kendal.* Dalton. *Mannheim.* Hemmer.
" 24. *Edsberg.* Wilse. *Copenhagen.* Bugge.
" 25. *Montmorenci.* Cotte.
" 26. *Mannheim.* Hemmer. *Stockholm.* Nicander.
" 31. *Gothaab.* Ginge. *Rochelle.* Seignette.
" 31. *Munich.* Huebpauer. *Sagan.* Preus.
Apr. 2. *Cambridge.* Williams.
" 2. *Jena.* Zeissing. *Gottingen.* Gatterer.
" 2. *Copenhagen.* Bugge. *Erfurt.* Planer.
" 2. *Edsberg.* Wilse. *Mannheim.* Hemmer.
" 2. *Ratisbon.* Heinrich. *Sagan.* Preus.
" 3. *Gothaab.* Ginge.
" 4. *Stockholm.* Nicander.
" 6. *Sagan.* Preus.
" 7. *Gothaab.* Ginge. *Stockholm.* Nicander.
" 8. *Stockholm.* Nicander.
" 12. *Sagan.* Preus.
" 14. *Cambridge.* Wigglesworth. Lovering.
" 14. *Cambridge.* Williams.
" 14. *Salem.* Holyoke. Lovering.
" 14. *Stockholm.* Nicander.
" 14. *St. Petersburg.* Euler.
" 15. *Stockholm.* Nicander.
" 16. *Sagan.* Preus.
" 17. *Mannheim.* Hemmer. *Stockholm.* Nicander.
" 18. *Cambridge.* Wigglesworth. Lovering.
" 18. *Cambridge.* Williams.
" 18. *Salem.* Holyoke. Lovering.
" 18. *Stockholm.* Nicander. *Padua.* Toaldo.
" 19. *Cambridge.* Williams.
" 19. *Salem.* Holyoke. Lovering.
" 19. *Edsberg.* Wilse. *Stockholm.* Nicander.
" 19. *St. Petersburg.* Euler.
" 19. *Rochelle.* Seignette. *Montmorenci.* Cotte.
" 19. *Erfurt.* Planer. *Kendal.* Dalton.
" 19. *Padua.* Toaldo. *Sagan.* Preus.
" 19. *Mannheim.* Hemmer. *Gottingen.* Gatterer.
" 20. *Kendal.* Dalton. *Mannheim.* Hemmer.
" 20. *Stockholm.* Nicander.
" 20. *St. Petersburg.* Euler.
" 20. *Copenhagen.* Bugge. *Rochelle.* Seignette.
" 21. *Copenhagen.* Bugge.
" 22. *Rochelle.* Seignette.
Apr. 23. *Mannheim.* Hemmer.
" 26. *Kendal.* Dalton. *Jena.* Zeissing.
May[1] 4. *Gottingen.* Gatterer.
" 10. *Rochelle.* Seignette.
" 11. *Ratisbon?* Heinrich.
" 12. *Kendal.* Dalton. *Bologna.* Matteucci.
" 13. *Prague.* Strnad. *Padua.* Toaldo.
" 13. *Montmorenci.* Cotte. *Berne.* Studer.
" 13. *Rome.* Calandrelli. *Buda.* Bruna.
" 13. *Ratisbon.* Heinrich. *Sagan.* Preus.
" 13. *Gottengen.* Gatterer. *Munich.* Huebpauer.
" 13. *Stockholm.* Nicander. *Rochelle.* Seignette.
" 13. *Paris.* Cassini. *Jena.* Zeissing.
" 13. *Marseilles.* Silvabella. *Bologna.* Matteucci.
" 14. *Gottingen.* Gatterer. *Prague.* Strnad.
" 14. *Rochelle.* Seignette.
" 14. *Paris.* Cassini. *Padua.* Toaldo.
" 15. *Cambridge.* Wigglesworth. Lovering.
" 15. *Cambridge.* Williams.
" 15. *Rochelle.* Seignette.
" 16. *Cambridge.* Wigglesworth. Lovering.
" 16. *Cambridge.* Williams.
" 16. *Salem.* Holyoke. Lovering.
" 16. *Paris.* Cassini. *Kendal.* Dalton.
" 17. *Cambridge.* Williams. *Kendal.* Dalton.
" 17. *Salem.* Holyoke. Lovering.
" 17. *Rochelle.* Seignette.
" 17. *Stockholm.* Nicander. *Rome.* Calandrelli.
" 18. *Paris.* Cassini. *Kendal.* Dalton.
" 19. *New Haven.* Stiles. Loomis.
" 19. *Paris.* Cassini. *Erfurt.* Planer.
" 21. *Mannheim.* Hemmer.
" 25. *Montmorenci.* Cotte.
" 29. *Rochelle.* Seignette.
June 2. *New Haven.* Stiles. Loomis.
" 5. *Rochelle.* Seignette.
" 6. *Prague.* Strnad.
" 7. *Kendal.* Dalton. *Rochelle.* Seignette.
" 8. *Cambridge.* Williams. *Paris.* Cassini.
" 8. *Salem.* Holyoke. Lovering.
" 9. *Cambridge.* Wigglesworth. Lovering.
" 9. *Cambridge.* Williams.
" 9. *Salem.* Holyoke. Lovering.
" 9. *New Haven.* Stiles. Loomis.
" 10. *Cambridge.* Wigglesworth. Lovering.
" 10. *Cambridge.* Williams.
" 10. *Montmorenci.* Cotte.

[1] An aurora was seen in Spain one day in this month. Mem. Acad. Cienc. Madrid. III. 77.

June 14. *Cambridge.* Wigglesworth. Lovering.
" 15. *Cambridge.* Williams.
" 16. *New Haven.* Stiles. Loomis.
" 18. *New Haven.* Stiles. Loomis.
" 19. *Cambridge.* Williams.
" 24. *Mannheim.* Hemmer. *Rome.* Calandrelli.
July 1. *New Haven.* Stiles. Loomis.
" 4. *Salem.* Holyoke. Lovering.
" 4. *New Haven.* Stiles. Loomis.
" 11. *Erfurt.* Planer.
" 13. *Cambridge.* Wigglesworth. Lovering.
" 13. *Cambridge.* Williams.
" 13. *Salem.* Holyoke. Lovering.
" 13. *New Haven.* Stiles. Loomis.
" 13. *Bologna.* Matteucci. *Mannheim.* Hemmer.
" 13. *Padua.* Toaldo. *Rome.* Calandrelli.
" 13. *Buda.* Bruna. *Sagan.* Preus.
" 13. *Rochelle.* Seignette. *Erfurt.* Planer.
" 13. *Marseilles.* Silvabella. *Spain.* Rico.
" 13. *Berne.* Studer. *Paris.* Cassini.
" 13. *Berlin.* Beguelin and Achard.
" 13. *Montmorenci.* Cotte.
" 14. *Cambridge.* Wigglesworth. Lovering.
" 14. *Cambridge.* Williams.
" 14. *Salem.* Holyoke. Lovering.
" 14. *New Haven.* Stiles. Loomis.
" 14. *Bologna.* Matteucci. *Padua.* Toaldo.
" 16. *Bologna.* Matteucci.
" 18. *Salem.* Holyoke. Lovering.
" 20. *Mannheim.* Hemmer.
" 22. *Mannheim.* Hemmer. *Sagan.* Preus.
" 23. *Salem.* Holyoke. Lovering.
" 30. *Berlin.* Beguelin and Achard.
Aug. 1. *Cambridge.* Wigglesworth. Lovering.
" 1. *Cambridge.* Williams.
" 1. *Salem.* Holyoke. Lovering.
" 7. *Ratisbon.* Heinrich. *Jena.* Zeissing.
" 7. *Paris.* Cassini. *Kendal.* Dalton.
" 7. *Gottingen.* Gatterer. *Berlin.* Achard.
" 7. *Erfurt.* Planer. *Mount St. Gothard, Milan.*
" 10. *Cambridge.* Wigglesworth. Lovering.
" 10. *Cambridge.* Williams.
" 10. *Salem.* Holyoke. Lovering.
" 10. *Stockholm.* Nicander. *Paris.* Cassini.
" 13. *Salem.* Holyoke. Lovering.
" 19. *Cambridge.* Wigglesworth. Lovering.
" 19. *Cambridge.* Williams.
" 19. *Salem.* Holyoke. Lovering.
" 19. *Kendal.* Dalton. *Mannheim.* Hemmer.
" 21. *Cambridge.* Williams.
Aug. 21. *Edsberg.* Wilse. *Paris.* Cassini.
" 25. *Mannheim.* Hemmer.
" 30. *Mannheim.* Hemmer.
Sept. 6. *Cambridge.* Wigglesworth. Lovering.
" 6. *Cambridge.* Williams.
" 6. *Salem.* Holyoke. Lovering.
" 6. *New Haven.* Stiles. Loomis. *Sagan.* Preus.
" 6. *Bologna.* Matteucci. *Gottingen.* Gatterer.
" 6. *Edsberg.* Wilse. *Paris.* Cassini.
" 7. *Edsberg.* Wilse. *Paris.* Cassini.
" 7. *Mannheim.* Hemmer. *Jena.* Zeissing.
" 7. *Stockholm.* Nicander.
" 8. *Mannheim.* Hemmer.
" 9. *Edsberg.* Wilse. *Stockholm.* Nicander.
" 10. *Sagan.* Preus.
" 18. *Cambridge.* Wigglesworth. Lovering.
" 18. *Cambridge.* Williams.
" 18. *Salem.* Holyoke. Lovering.
19. *Kendal.* Dalton.
" 23. *Mannheim.* Hemmer. *Stockholm.* Nicander.
" 26. *Prague.* Strnad.
" 28. *Mannheim.* Hemmer.
" 29. *Edsberg.* Wilse. *Moscow.* Stritter.
" 30. *Edsberg.* Wilse. *Mannheim.* Hemmer.
" 30. *Stockholm.* Nicander.
Oct. 1. *Edsberg.* Wilse. *Sagan.* Preus.
" 2. *Edsberg.* Wilse.
" 3. *Moscow.* Stritter.
" 4. *Cambridge.* Wigglesworth. Lovering.
" 4. *Cambridge.* Williams. *Sagan.* Preus.
" 4. *Kendal.* Dalton. *Jena.* Zeissing.
" 5. *Cambridge.* Wigglesworth. Lovering.
" 5. *Cambridge.* Williams.
" 5. *Salem.* Holyoke. Lovering. *Jena.* Zeissing.
" 5. *Gottingen.* Gatterer. *Sagan.* Preus.
" 5. *Mannheim.* Hemmer. *Ratisbon.* Heinrich.
" 5. *Bavaria.* Kettel. *Prague.* Strnad.
" 5. *Erfurt.* Planer. *Edsberg.* Wilse.
" 5. *Bologna.* Matteucci. *Rome.* Calandrelli.
" 5. *Munich.* Huebpauer. *Würzburg.* Egel.
" 6. *Moscow.* Stritter. *Montmorenci.* Cotte.
" 6. *Geneva.* Senebier. Deluc.[1]
" 6. *Würzburg.* Egel. *Marseilles.* Silvabella.
" 6. *St. Petersburg.* Euler. *Sagan.* Preus.
" 6. *Paris.* Cassini. *Erfurt.* Planer.
" 6. *Peissenberg.* Schwaiger. *Berne.* Studer.
" 6. *Tigurina.* Aedes. Magold.
" 6. *Bologna.* Matteucci. *Rome.* Calandrelli.
" 6. *Kendal.* Dalton. *Gottingen.* Gatterer.
" 6. *Padua.* Toaldo. *Munich.* Huebpauer.

Oct. 6. *Ratisbon.* Heinrich. *Jena.* Zeissing.
" 6. *Mannheim.* Hemmer. *Buda.* Bruna.
" 6. *Mount St. Andex, Bavaria.* Kettel.
" 7. *Salem.* Holyoke. Lovering.
" 7. *Kendal.* Dalton. *Padua.* Toaldo.
" 7. *Ratisbon.* Heinrich. *Stockholm.* Nicander.
" 9. *Edsberg.* Wilse.
" 10. *Würzberg.* Egel. *Ratisbon.* Heinrich.
" 10. *Tigurina.* Aedes, *Bavaria.* Magold.
" 10. *Buda.* Bruna. *Berne.* Studer.
" 10. *Sagan.* Preus. *Munich.* Huebpauer.
" 10. *Peissenberg.* Schwaiger.
" 12. *Cambridge.* Williams. *Stockholm.* Nicander.
" 13. *Cambridge.* Wigglesworth. Lovering.
" 13. *Salem.* Holyoke. Lovering.
" 13. *Berlin.* Beguelin and Achard.
" 13. *Sagan.* Preus. *Copenhagen.* Bugge.
" 13. *Prague.* Strnad. *Paris.* Cassini.
" 13. *Sutz.* Sprüngli. *Berne.* Studer.
" 13. *Geneva.* Senebier. Deluc.
" 13. *Gottingen.* Gatterer. *Erfurt.* Planer.
" 13. *Buda.* Bruna. *Rochelle.* Seignette.
" 13. *Stockholm.* Nicander. *Padua.* Toaldo.
" 14. *Berlin.* Beguelin and Achard.
" 16. *Rochelle.* Seignette. *Stockholm.* Nicander.
" 17. *Kendal.* Dalton. *Sagan.* Preus.
" 17. *Berlin.* Beguelin and Achard.
" 17. *Geneva.* Senebier. Deluc.
" 17. *Prague.* Strnad. *Berne.* Studer.
" 17. *Rochelle.* Seignette. *Marseilles.* Silvabella.
" 19. *Kendal.* Dalton.
" 20. *Berlin.* Beguelin and Achard.
" 21. *Paris.* Cassini.
" 24. *Jena.* Zeissing. *Ratisbon.* Heinrich.
" 24. *Buda.* Bruna. *Sagan.* Preus.
" 31. *Cambridge.* Wigglesworth. Lovering.
" 31. *Cambridge.* Williams.
" 31. *New Haven.* Stiles. Loomis. *Berne.* Studer.
" 31. *Mannheim.* Hemmer. *St. Petersburg.* Euler.
" 31. *Ratisbon.* Heinrich. *Rochelle.* Seignette.
" 31. *Munich.* Huebpauer. *Sagan.* Preus.
" 31. *Bavaria.* Kettel. *Stockholm.* Nicander.
" 31. *Würzburg.* Egel. *Erfurt.* Planer.
" 31. *Prague.* Strnad. *Buda.* Bruna.
" 31. *Geneva.* Deluc. *Jena.* Zeissing.
" 31. *Tigurina Aedes, Bavaria.* Magold.
Nov. 2. *Sagan.* Preus.
" 3. *Cambridge.* Wigglesworth. Lovering.

[1] L'Institut. X. 341.

Nov. 3. *Cambridge.* Williams.
" 3. *Salem.* Holyoke. Lovering.
" 3. *Stockholm.* Nicander.
" 3. *Prague.* Strnad. *Sagan.* Preus.
" 4. *Cambridge.* Wigglesworth. Lovering.
" 4. *Cambridge.* Williams.
" 4. *Salem.* Holyoke. Lovering.
" 4. *Kendal.* Dalton. *Gottingen.* Gatterer.
" 4. *Stockholm.* Nicander.
" 4. *Berlin.* Beguelin and Achard.
" 7. *Sagan.* Preus. *Stockholm.* Nicander.
" 8. *Paris.* Cassini. *Erfurt.* Planer.
" 8. *Ratisbon.* Heinrich. *Stockholm.* Nicander.
" 8. *Kendal.* Dalton. *Brussels.* Mann.
" 8. *Munich.* Huebpauer. *Mannheim.* Hemmer.
" 8. *Geneva.* Senebier. *Sagan.* Preus.
" 8. *Rome.* Calandrelli. *Sutz.* Sprüngli.
" 8. *Peissenberg.* Schwaiger. *Berne.* Studer.
" 9. *Prague.* Strnad. *Buda.* Bruna.
" 9. *Brussels.* Mann. *Mannheim.* Hemmer.
" 9. *Bavaria.* Kettel. *Munich.* Huebpauer.
" 9. *Peissenberg.* Schwaiger. *Sagan.* Preus.
" 9. *Tigurina Aedes, Bavaria.* Magold.
" 10. *Mannheim.* Hemmer.
" 12. *Würzburg.* Egel.
" 13. *Mannheim.* Hemmer.
" 20. *Würzburg.* Egel.
" 21. *Montmorenci.* Cotte.
" 24. *Cambridge.* Wigglesworth. Lovering.
" 24. *Cambridge.* Williams.
" 26. *Berlin.* Beguelin and Achard. *Berne.* Studer.
" 26. *Mannheim.* Hemmer. *Sutz.* Sprüngli.
" 26. *Paris.* Cassini. *Erfurt.* Planer.
" 26. *Rochelle.* Seignette. *Stockholm.* Nicander.
" 26. *Ratisbon.* Heinrich. *Montmorenci.* Cotte.
" 26. *Rome.* Calandrelli. *Sagan.* Preus.
" 28. *Kendal.* Dalton.
" 29. *Kendal.* Dalton.
" 29. *Berlin.* Beguelin and Achard.
" 30. *Kendal.* Dalton. *Stockholm.* Nicander.
Dec. 1. *Cambridge.* Wigglesworth. Lovering.
" 1. *Cambridge.* Williams.
" 2. *Stockholm.* Nicander.
" 3. *Stockholm.* Nicander.
" 6. *Rochelle.* Seignette.
" 7. *Stockholm.* Nicander.
" 8. *Salem.* Holyoke. Lovering.
" 9. *Cambridge.* Wigglesworth. Lovering.
" 9. *Cambridge.* Williams.
" 9. *Salem.* Holyoke. Lovering.

Dec. 9. *New Haven.* Stiles. Loomis.
" 9. *Paris.* Cassini. *Stockholm.* Nicander.
" 10. *Mannheim.* Hemmer. *Sagan.* Preus.
" 13. *Stockholm.* Nicander.
" 15. *Sagan.* Preus.
" 16. *Berne.* Studer.
" 18. *Stockholm.* Nicander.

1788.

Jan. 3. *Sagan.* Preus.
" 4. *Mannnheim.* Hemmer.
" 5. *Sagan?* Preus.
" 8. *Sagan?* Preus.
" 9. *Mannheim.* Hemmer. *Kendal.* Dalton.
" 10. *Salem.* Holyoke. Lovering. *Kendal.* Dalton.
" 11. *Stockholm.* Nicander. *Kendal.* Dalton.
" 12. *Stockholm.* Nicander.
" 13. *Kendal.* Dalton. Nicander.
" 14. *Sagan?* Preus. *Stockholm.* Nicander.
" 14. *Cambridge.* Wigglesworth. Lovering.
" 14. *Salem.* Holyoke. Lovering. *Kendal.* Dalton.
" 15. *Kendal.* Dalton.
" 17. *Stockholm.* Nicander.
Feb. 2. *Sagan.* Preus.
" 4. *Berlin.* Beguelin and Achard.
" 4. *Kendal.* Dalton. *Sagan?* Preus.
" 5. *Cambridge.* Wigglesworth. Lovering.
" 5. *Salem.* Holyoke. Lovering.
" 5. *New Haven.* Stiles. Loomis.
" 6. *Keswick.* Dalton. *St. Petersburg.* Euler.[1]
" 7. *Keswick.* Dalton.
" 8. *Stockholm.* Nicander. *Kendal.* Dalton.
" 9. *Sagan.* Preus.
" 11. *New Haven.* Stiles. Loomis.
" 11. *Middleburg.* Van de Perre.
" 11. *Stockholm.* Nicander. Ratisbon. Heinrich.
" 11. *Mannheim.* Hemmer. *Brussels.* Mann.
" 11. *Tigurina Aedes.* Magold. *Spain.* Rico.[2]
" 11. *Sagan.* Preus. *Rochelle.* Seignette.
" 11. *Munich.* Huebpauer. *Padua.* Toaldo.
" 11. *Erfurt.* Planer. *Copenhagen.* Bugge.
" 11. *Jena.* Zeissing. Geneva. Deluc.
" 11. *Buda.* Bruna. *Berlin.* Beguelin and Achard.
" 11. *Montmorenci.* Cotte.
" 12. *Sagan.* Preus. *Keswick.* Dalton.
" 15. *Rome.* Calandrelli. *Spain.* Rico.
" 15. *Buda.* Bruna. *Erfurt.* Planer.

[1] Nova Acta Sci. Acad. Petrop. VI. 338.
[2] Mem. Acad. Cienc. Madrid. III. 77.

Feb. 15. *Jena.* Zeissing. *Stockholm.* Nicander.
" 22. *Mannheim.* Hemmer.
Mar. 3. *Spain.* Rico.
" 4. *Stockholm.* Nicander.
" 5. *Stockholm.* Nicander.
" 6. *Stockholm.* Nicander.
" 7. *Sagan.* Preus. *Kendal.* Dalton.
" 7. *Rome.* Calandrelli.
" 8. *Sagan?* Preus. *Kendal.* Dalton.
" 14. *Mannheim.* Hemmer. *Stockholm.* Nicander.
" 22. *Mannheim.* Hemmer.
" 26. *Stockholm.* Nicander.
" 27. *Cambridge.* Wigglesworth. Lovering.
" 27. *Stockholm.* Nicander. *Brussels.* Mann.
" 28. *Cambridge.* Wigglesworth. Lovering.
" 28. *Mannheim.* Hemmer. *Paris.* Cassini.[2]
" 28. *Kendal.* Dalton. *St. Petersburg.* Euler.
" 30. *Stockholm.* Nicander.
Apr. 1. *Cambridge.* Wigglesworth. Lovering.
" 1. *Sagan?* Preus. *Stockholm.* Nicander.
" 1. *Paris.* Cassini. *Montmorenci.* Cotte.
" 1. *Kendal.* Dalton. *Sagan.* Preus.
" 2. *Geneva.* Deluc. *Montmorenci.* Cotte.
" 3. *Sagan?* Preus. *Kendal.* Dalton.
" 4. *Brussels.* Mann.
" 6. *Sagan.* Preus. *Stockholm.* Nicander.
" 6. *Copenhagen.* Bugge. *Jena.* Zeissing.
" 7. *Kendal.* Dalton.
" 8. *Stockholm.* Nicander.
" 9. *Stockholm.* Nicander.
" 10. *Ratisbon?* Heinrich.
" 14. *Kendal.* Dalton.
" 21. *Mannheim?* Hemmer.
" 24. *Sagan.* Preus.
" 26. *Sagan.* Preus.
" 27. *Sagan.* Preus. *Kendal.* Dalton.
" 27. *Stockholm.* Nicander. *Montmorenci.* Cotte.
" 28. *Kendal.* Dalton. *Brussels.* Mann.
" 29. *Cambridge.* Wigglesworth. Lovering.
" 29. *New Haven.* Stiles. Loomis.
" 29. *Kendal.* Dalton. *Paris.* Cassini.
" 29. *Stockholm.* Nicander. *Ratisbon.* Heinrich.
" 30. *Paris.* Cassini. *Kendal.* Dalton.
May 1. *Kendal.* Dalton.
" 2. *Salem.* Holyoke. Lovering.
" 2. *Stockholm.* Nicander. *Paris.* Cassini.
" 3. *Brussels.* Mann.
" 4. *New Haven.* Stiles. Loomis. *Kendal.* Dalton.
" 5. *Jena.* Zeissing.

[1] Mém. de l'Acad. 1788. p. 72.

May 6. *Moscow.* Stritter.
" 7. *Brussels.* Mann.
" 10. *Brussels.* Mann. *Kendal.* Dalton.
" 11. *Kendal.* Dalton.
" 24. *Kendal.* Dalton. *Geneva.* Deluc.
" 24. *Padua.* Toaldo. *Paris.* Cassini.
" 24. *Mannheim.* Hemmer. *Dublin.* Usher.
" 24. *Montmorenci.* Cotte.
" 25. *Cambridge.* Wigglesworth. Lovering.
" 25. *Salem.* Holyoke. Lovering.
" 25. *New Haven.* Stiles. Loomis.
" 25. *Mannheim.* Hemmer. *Paris.* Cassini.
" 25. *Kendal.* Dalton. *Brussels.* Mann.
" 25. *Dublin, Ireland.* Usher.[1]
" 26. *Ratisbon.* Heinrich. *Brussels.* Mann.
" 27. *Kendal.* Dalton.
" 28. *New Haven.* Stiles. Loomis.
" 29. *Cambridge.* Wigglesworth. Lovering.
" 30. *Salem.* Holyoke. Lovering. *Kendal.* Dalton.
" 31. *Cambridge.* Wigglesworth. Lovering.
" 31. *Salem.* Holyoke. Lovering. *Jena.* Zeissing.
June[2] 3. *Kendal.* Dalton.
" 4. *Padua.* Toaldo and Chiminello.
" 5. *Brussels.* Mann.
" 9. *Brussels.* Mann.
" 25. *Brussels.* Mann. *Jena.* Zeissing.
" 27. *Brussels.* Mann.
" 28. *Brussels.* Mann.
July 1. *Brussels.* Mann.
" 2. *Salem.* Holyoke. Lovering.
" 2. *Mannheim.* Hemmer.
" 3. *Paris.* Cassini.
" 5. *Jena.* Zeissing.
" 14. *Mannheim.* Hemmer.
" 15. *Mt. St. Gothard.* P. L. of Milan.
" 25. *Cambridge.* Wigglesworth. Lovering.
" 25. *Salem.* Holyoke. Lovering.
" 30. *Cambridge.* Wigglesworth. Lovering.
" 30. *Salem.* Holyoke. Lovering.
" 30. *New Haven.* Stiles. Loomis.
" 30. *Kendal.* Dalton. *Berne.* Studer.
" 30. *Ratisbon.* Heinrich. *Paris.* Cassini.
" 31. *Cambridge.* Wigglesworth. Lovering.
" 31. *Salem.* Holyoke. Lovering.
" 31. *Sagan?* Preus. *Jena.* Zeissing.
Aug. 1. *Cambridge.* Wigglesworth. Lovering.
" 1. *Salem.* Holyoke. Lovering.

[1] Mem. Irish Acad. II. 189.

[2] An aurora was seen in Spain one day of this month. Mem. Acad. Cienc. Madrid. III. 77.

Aug. 1. *New Haven.* Stiles. Loomis.
" 1. *Kendal.* Dalton. *Rochelle.* Seignette.
" 2. *New Haven.* Stiles. Loomis. *Kendal.* Dalton.
" 3. *Kendal.* Dalton.
" 11. *Mannheim.* Hemmer.
" 16. *Stockholm.* Nicander.
" 19. *Kendal.* Dalton. *Jena.* Zeissing.
" 19. *Sagan.* Preus. *Stockholm.* Nicander.
" 20. *Rome.* Calandrelli.
" 22. *Spain.* Rico.
" 23. *Cambridge.* Wigglesworth. Lovering.
" 23. *Salem.* Holyoke. Lovering.
" 23. *New Haven.* Stiles. Loomis.
" 23. *Mannheim.* Hemmer. *Rome.* Calandrelli.
" 23. *Paris.* Cassini. *Kendal.* Dalton.
" 23. *Montmorenci.* Cotte.
" 24. *Mannheim.* Hemmer.
" 26. *Cambridge.* Wigglesworth. Lovering.
" 26. *Salem.* Holyoke. Lovering.
" 26. *New Haven.* Stiles. Loomis.
" 27. *Cambridge.* Wigglesworth. Lovering.
" 27. *Salem.* Holyoke. Lovering. *Jena.* Zeissing.
" 27. *New Haven.* Stiles. Loomis.
" 28. *Cambridge.* Wigglesworth. Lovering.
" 28. *Salem.* Holyoke. Lovering.
" 28. *New Haven.* Stiles. Loomis.
" 28. *Moscow.* Stritter. *Jena.* Zeissing.
" 28. *Sagan?* Preus. *Stockholm.* Nicander.
" 29. *New Haven.* Stiles. Loomis.
" 29. *Würzburg.* Egel. *Spain.* Rico.
" 29. *Sagan?* Preus. *Mannheim.* Hemmer.
" 29. *Kendal.* Dalton. *Jena.* Zeissing.
" 31. *New Haven.* Stiles. Loomis. *Sagan?* Preus.
Sept. 1. *Sagan.* Preus. *Stockholm.* Nicander.
" 1. *Brussels.* Mann.
" 2. *Cambridge.* Wigglesworth. Lovering.
" 2. *Salem.* Holyoke. Lovering.
" 2. *New Haven.* Stiles. Loomis.
" 2. *Kendal.* Dalton. *Geneva.* Deluc.
" 3. *Cambridge.* Wigglesworth. Lovering.
" 3. *Salem.* Holyoke. Lovering.
" 3. *New Haven.* Stiles. Loomis.
" 3. *Erfurt.* Planer. *Stockholm.* Nicander
" 3. *Jena.* Zeissing. *St. Petersburg.* Euler.
" 4. *Cambridge.* Wigglesworth. Lovering.
" 4. *Salem.* Holyoke. Lovering.
" 4. *New Haven.* Stiles. Loomis.
" 4. *Paris.* Cassini.
" 4. *Jena.* Zeissing. *St. Petersburg.* Euler.
" 4. *Mannheim.* Hemmer. *Sagan.* Preus.

Sept. 4. *Ratisbon.* Heinrich. *Brussels.* Mann.
" 5. *Salem.* Holyoke. Lovering.
" 5. *New Haven.* Stiles. Loomis. *Berne.* Studer.
" 5. *Mannheim.* Hemmer. *Padua.* Toaldo.
" 5. *Munich.* Huebpauer. *Sagan.* Preus.
" 5. *Erfurt.* Planer. *Würzburg.* Egel.
" 5. *Ratisbon.* Heinrich. *St. Petersburg.* Euler.
" 5. *Tigurina Aedes.* Magold. *Jena.* Zeissing.
" 5. *Rome.* Calandrelli. *Sutz.* Sprüngli.
" 6. *Erfurt.* Planer. *Würzburg.* Egel.
" 6. *St. Petersburg.* Euler.
" 6. *Kendal.* Dalton. *Sagan.* Preus.
" 7. *Würzburg.* Egel.
" 8. *Stockholm.* Nicander.
" 10. *Cambridge.* Wigglesworth. Lovering.
" 10. *Kendal.* Dalton. *Jena.* Zeissing.
" 10. *Stockholm.* Nicander.
" 12. *Mannheim.* Hemmer.
" 18. *Stockholm.* Nicander.
" 20. *Munich.* Huebpauer.
" 24. *Cambridge.* Wigglesworth. Lovering.
" 24. *Spain.* Rico. *Jena.* Zeissing.
" 24. *Tigurina Aedes.* Magold.
" 24. *Stockholm.* Nicander. *Sagan.* Preus.
" 24. *Mannheim.* Hemmer. *Erfurt.* Planer.
" 25. *Cambridge.* Wigglesworth. Lovering.
" 25. *Salem.* Holyoke. Lovering.
" 25. *Stockholm.* Nicander.
" 26. *Cambridge.* Wigglesworth. Lovering.
" 26. *Salem.* Holyoke. Lovering.
" 26. *Stockholm.* Nicander. *Moscow.* Stritter.
" 26. *St. Petersburg.* Euler.
" 27. *Sagan.* Preus. *St. Petersburg.* Euler.
" 28. *Salem.* Holyoke. Lovering.
" 29. *Sagan?* Preus. *Stockholm.* Nicander.
Oct. 1. *Stockholm.* Nicander.
" 2. *Stockholm.* Nicander.
" 3. *Stockholm.* Nicander.
" 4. *Cambridge.* Wigglesworth. Lovering.
" 4. *Stockholm.* Nicander.
" 5. *Cambridge.* Wigglesworth. Lovering.
" 5. *Salem.* Holyoke. Lovering.
" 6. *Salem.* Holyoke. Lovering.
" 9. *Stockholm.* Nicander.
" 11. *Stockholm.* Nicander.
" 12. *Mannheim.* Hemmer.
" 12. *Paris.* Cassini. *Kendal.* Dalton.
" 18. *Sagan?* Preus.
" 21. *Kendal.* Dalton. *Spain.* Rico.
" 21. *Marseilles.* St. Jacques. *Geneva.* Senebier.
Oct. 21. *St. Petersburg.* Euler.
" 22. *Cambridge.* Wigglesworth. Lovering.
" 22. *Salem.* Holyoke. Lovering. *Spain.* Rico.
" 22. *St. Petersburg.* Euler.[1] *Jena.* Zeissing.
" 22. *Moscow.* Stritter. *Rochelle.* Seignette.
" 22. *Geneva.* Senebier. Deluc.
" 22. *Marseilles.* St. Jacques. *Beziers.* Bertholon.
" 22. *Padua.* Toaldo. *Rome.* Calandrelli.
" 22. *Mannheim.* Hemmer. *Buda.* Bruna.
" 22. *Sagan.* Preus. *Erfurt.* Planer.
" 24. *Stockholm.* Nicander. *Kendal.* Dalton.
" 25. *Sagan.* Preus. *Stockholm.* Nicander.
" 26. *Geneva.* Senebier.
" 27. *Sagan.* Preus. *Keswick.* Dalton.
" 27. *Stockholm.* Nicander.
" 28. *Sagan?* Preus. *Stockholm.* Nicander.
" 29. *Sagan.* Preus.
" 30. *Cambridge.* Wigglesworth. Lovering.
" 30. *Salem.* Holyoke. Lovering.
" 30. *Sagan.* Preus. *Kendal.* Dalton.
" 31. *Paris.* Cassini. *Kendal.* Dalton.
" 31. *Stockholm.* Nicander. *Laon.* Cotte.
Nov. 1. *Geneva.* Senebier. *Kendal.* Dalton.
" 2. *Erfurt.* Planer. *Sagan.* Preus.
" 3. *Sagan?* Preus.
" 4. *Stockholm.* Nicander.
" 7. *Stockholm.* Nicander.
" 18. *Sagan.* Preus.
" 19. *Kendal.* Dalton.
" 21. *Stockholm.* Nicander.
" 22. *Stockholm.* Nicander.
" 23. *Mannheim.* Hemmer. *Sagan.* Preus.
" 26. *Sagan?* Preus.
" 27. *Kendal.* Dalton.
" 28. *Kendal.* Dalton.
" 30. *Stockholm.* Nicander. *Kendal.* Dalton.
Dec. 8. *Mannheim.* Hemmer.
" 15. *Mannheim.* Hemmer.
" 16. *Mannheim.* Hemmer.
" 20. *Peissenberg.* Schwaiger.
" 21. *Kendal.* Dalton.
" 22. *Stockholm.* Nicander.
" 23. *Sagan.* Preus. *Brussels.* Mann.
" 23. *Paris.* Cassini. *Ratisbon.* Heinrich.
" 23. *Berne.* Studer.
" 24. *Stockholm.* Nicander. *Kendal.* Dalton.
" 25. *Stockholm.* Nicander.
" 26. *Stockholm.* Nicander.
" 30. *Mannheim.* Hemmer.

[1] Aurora Australis.

1789.

Jan. 11. *Stockholm.* Nicander. *Kendal.* Dalton.
" 13. *Stockholm.* Nicander.
" 19. *Sagan.* Preus.
" 21. *Mannheim.* Hemmer.
" 24. *Sagan?* Preus.
" 29. *Sagan.* Preus. *Stockholm.* Nicander.
" 30. *Sagan.* Preus.
Feb. 2. *Mannheim.* Hemmer. *Stockholm.* Nicander.
" 6. *St. Petersburg.* Euler.
" 15. *Cambridge.* Wigglesworth. Lovering.
" 15. *New Haven.* Stiles. Loomis. *Berne.* Studer.
" 15. *Stockholm.* Nicander. *Keswick.* Dalton.
" 16. *Salem.* Holyoke. Lovering.
" 17. *Stockholm.* Nicander.
" 23. *Sagan.* Preus. *Kendal.* Dalton.
" 23. *Stockholm.* Nicander.
" 26. *Cambridge.* Wigglesworth. Lovering.
" 26. *Salem.* Holyoke. Lovering.
" 26. *Mannheim.* Hemmer. *Kendal.* Dalton.
" 28. *Stockholm.* Nicander. *Kendal.* Dalton.
Mar. 2. *Stockholm.* Nicander.
" 3. *Stockholm.* Nicander. *Moscow.* Stritter.
" 4. *Stockholm.* Nicander. *Moscow.* Stritter.
" 14. *Cambridge.* Wigglesworth. Lovering.
" 14. *Salem.* Holyoke. Lovering.
" 14. *Kendal.* Dalton. *Spain.* Rico.
" 14. *Brussels.* Mann. *Paris.* Cassini.[1]
" 16. *Stockholm.* Nicander. *Kendal.* Dalton.
" 17. *Stockholm.* Nicander.
" 20. *Mannheim.* Hemmer.
" 22. *Sagan?* Preus.
" 26. *Cambridge.* Wigglesworth. Lovering.
" 26. *Salem.* Holyoke. Lovering.
" 27. *Cambridge.* Wigglesworth. Lovering.
" 27. *Salem.* Holyoke. Lovering.
" 27. *New Haven.* Stiles. Loomis.
" 27. *Geneva.* Senebier. Deluc. *Berne.* Studer.
" 27. *Brussels.* Mann. *Paris.* Cassini.
" 27. *Stockholm.* Nicander. *Ratisbon.* Heinrich.
" 27. *Marseilles.* St. Jacques. *Buda.* Bruna.
" 27. *Mannheim.* Hemmer. *Rome.* Calandrelli.
" 27. *Jena.* Zeissing. *St. Petersburg.* Euler.[2]
" 27. *Montmorenci.* Cotte. *Sutz.* Sprüngli.
" 28. *Ratisbon.* Heinrich. *Brussels.* Mann.
" 28. *Sagan.* Preus. *Rochelle.* Seignette.
" 28. *Sutz.* Sprüngli. *Berne.* Studer.

[1] Mém. de l'Acad. 1789.
[2] Nova. Acta. Sci. Acad. Petrop. VII. 407.

Mar. 28. *Mannheim.* Hemmer. *St. Petersburg.* Euler.
" 29. *Salem.* Holyoke. Lovering.
" 29. *Kendal.* Dalton.
" 29. *Brussels.* Mann. *Berlin.* Achard.
" 29. *Sagan.* Preus. *Marseilles.* St. Jacques.
" 30. *Berlin.* Achard. *Sagan.* Preus.
" 30. *Brussels.* Mann. *Kendal.* Dalton.
" 31. *New Haven.* Stiles. Loomis. *Sagan?* Preus.
Apr. 1. *Stockholm.* Nicander. *Brussels.* Mann.
" 2. *St. Petersburg.* Euler.
" 9. *Moscow.* Stritter.
" 11. *Stockholm.* Nicander.
" 12. *Stockholm.* Nicander. *Kendal.* Dalton.
" 13. *Stockholm.* Nicander. *Kendal.* Dalton.
" 15. *Stockholm.* Nicander.
" 17. *Cambridge.* Wigglesworth. Lovering.
" 17. *Stockholm.* Nicander. *Brussels.* Mann.
" 18. *Stockholm.* Nicander.
" 20. *Sagan?* Preus. *Stockholm.* Nicander.
" 26. *Cambridge.* Wigglesworth. Lovering.
" 26. *Salem.* Holyoke. Lovering.
" 26. *New Haven.* Stiles. Loomis.
" 26. *Stockholm.* Nicander. *Laon.* Cotte.
" 27. *Cambridge.* Wigglesworth. Lovering.
" 27. *Salem.* Holyoke. Lovering. *Sagan?* Preus.
" 29. *Mannheim.* Hemmer. *Sagan?* Preus.
" 30. *Kendal.* Dalton.
May 15. *Brussels.* Mann.
" 16. *Brussels.* Mann.
" 17. *Mannheim.* Hemmer.
" 20. *Salem.* Holyoke. Lovering.
" 21. *Cambridge.* Wigglesworth. Lovering.
" 21. *Salem.* Holyoke. Lovering.
" 21. *New Haven.* Stiles. Loomis.
" 22. *Cambridge.* Wigglesworth. Lovering.
" 22. *Salem.* Holyoke. Lovering.
" 22. *New Haven.* Stiles. Loomis.
" 23. *Cambridge.* Wigglesworth. Lovering.
" 23. *Salem.* Holyoke. Lovering.
" 23. *New Haven.* Stiles. Loomis.
" 23. *Ratisbon.* Heinrich. *Paris.* Cassini.
" 24. *Cambridge.* Wigglesworth. Lovering.
" 24. *Salem.* Holyoke. Lovering.
" 24. *Rome.* Calandrelli.
" 28. *Cambridge.* Wigglesworth. Lovering.
" 28. *Salem.* Holyoke. Lovering.
" 28. *New Haven.* Stiles. Loomis.
" 28. *Brussels.* Mann.
" 29. *Brussels.* Mann.
" 31. *New Haven.* Stiles. Loomis. *Sagan.* Preus.

June 2. *Paris.* Cassini.
" 12. *New Haven.* Stiles. Loomis.
" 12. *Kendal.* Dalton. *Paris.* Cassini.
" 13. *Ratisbon.* Heinrich.
" 15. *Salem.* Holyoke. Lovering.
" 15. *New Haven.* Stiles. Loomis.
" 16. *New Haven.* Stiles. Loomis.
" 16. *Ratisbon.* Heinrich.
" 17. *Salem.* Holyoke. Lovering.
" 18. *New Haven.* Stiles. Loomis.
" 19. *Salem.* Holyoke. Lovering.
" 19. *Ratisbon.* Heinrich.
" 20. *Salem.* Holyoke. Lovering.
" 23. *Salem.* Holyoke. Lovering.
" 29. *Salem.* Holyoke. Lovering.
" 30. *Brussels.* Mann.
July 10. *New Haven.* Stiles. Loomis.
" 11. *Salem.* Holyoke. Lovering.
" 14. *New Haven.* Stiles. Loomis.
" 15. *Brussels.* Mann.
" 17. *New Haven.* Stiles. Loomis.
" 18. *Brussels.* Mann.
" 19. *Brussels.* Mann.
" 20. *Salem.* Holyoke. Lovering.
" 20. *Brussels.* Mann.
" 23. *Brussels.* Mann.
" 24. *Paris.* Cassini.
" 25. *Cambridge.* Wigglesworth. Lovering.
" 26. *Salem.* Holyoke. Lovering.
" 26. *New Haven.* Stiles. Loomis.
" 27. *Cambridge.* Wigglesworth. Lovering.
" 28. *Salem.* Holyoke. Lovering.
" 28. *New Haven.* Stiles. Loomis. *Laon.* Cotte.
" 29. *Salem.* Holyoke. Lovering.
" 29. *Brussels.* Mann.
Aug. 13. *Keswick.* Dalton.
" 14. *Stockholm.* Nicander.
" 14. *Sagan.* Preus. *Kendal.* Dalton.
" 15. *Paris.* Cassini. *Kendal.* Dalton.
" 16. *Kendal.* Dalton.
" 17. *Kendal.* Dalton. *Stockholm.* Nicander.
" 18. *Cambridge.* Wigglesworth. Lovering.
" 18. *Salem.* Holyoke. Lovering.
" 18. *Kendal.* Dalton.
" 19. *Kendal.* Dalton. *St. Petersburg.* Euler.
" 19. *Peissenberg.* Schwaiger. *Sagan.* Preus.
" 19. *Berne.* Studer.
" 20. *Kendal.* Dalton.
" 21. *Stockholm.* Nicander. *St. Petersburg.* Euler.
" 22. *Stockholm.* Nicander.
Aug. 24. *Cambridge.* Wigglesworth. Lovering.
" 24. *Salem.* Holyoke. Lovering.
" 24. *Stockholm.* Nicander. *Paris.* Cassini.
" 24. *St. Petersburg.* Euler.
" 25. *Sagan?* Preus. *Ratisbon.* Heinrich.
" 25. *Stockholm.* Nicander.
" 25. *Paris.* Cassini. *Kendal.* Dalton.
" 26. *Stockholm.* Nicander.
" 28. *Stockholm.* Nicander.
" 29. *Stockholm.* Nicander.
Sept. 9. *Salem.* Holyoke. Lovering.
" 10. *Stockholm.* Nicander.
" 12. *Stockholm.* Nicander.
" 13. *Stockholm.* Nicander.
" 14. *Stockholm.* Nicander. *Kendal.* Dalton.
" 15. *Kendal.* Dalton.
" 16. *St. Petersburg.* Euler.
" 17. *Brussels.* Mann.
" 20. *Stockholm.* Nicander.
" 20. *Kendal.* Dalton. *Sagan.* Preus.
" 21. *Salem.* Holyoke. Lovering.
" 21. *Brussels.* Mann.
" 22. *Salem.* Holyoke. Lovering.
" 23. *Kendal.* Dalton.
" 24. *Sagan.* Preus.
" 25. *Sutz.* Sprüngli. *Berne.* Studer.
" 26. *Kendal.* Dalton. *Falaise.* Hervieu.[1]
" 26. *Rochelle.* Seignette. *Laon.* Cotte.
" 26. *Mannheim.* Hemmer.
" 26. *Peissenberg.* Schwaiger. *Berne.* Studer.
" 26. *Brussels.* Mann. *Paris.* Cassini.
" 27.[2] *Stockholm.* Nicander. *Sagan?* Preus.
" *x.* *Falaise.* Hervieu. Boué.
Oct. 11.[3] *St. Petersburg.* Euler.
" 12. *Stockholm.* Nicander.
" 13. *Stockholm.* Nicander.
" 16. *Salem.* Holyoke. Lovering.
" 18. *Kendal.* Dalton. *St. Petersburg.* Euler.
" 19. *Cambridge.* Wigglesworth. Lovering.
" 19. *Salem.* Holyoke. Lovering.
" 19. *New Haven.* Stiles. Loomis.
" 19. *Kendal.* Dalton. *St. Petersburg.* Euler.
" 19. *Marseilles.* St. Jacques. *Moscow.* Stritter.
" 20. *Kendal.* Dalton. *St. Petersburg.* Euler.
" 20. *Jena.* Zeissing. *Moscow.* Stritter.
" 20. *Brussels.* Mann. *Paris.* Cassini.

[1] Encyc. Method. I. 368.
[2] Journ. de Phys. XXXVI. 440.
[3] An aurora was seen in Spain on one day of this month.

Oct. 20. *Peissenberg.* Schwaiger. *Sagan.* Preus.
" 21. *Salem.* Holyoke. Lovering.
" 21. *Brussels.* Mann.
" 23. *Cambridge.* Wigglesworth. Lovering.
" 23. *Salem.* Holyoke. Lovering.
" 23. *Kendal.* Dalton.
" 23. *Stockholm.* Nicander. *Moscow.* Stritter.
" 24. *St. Petersburg.* Euler.
" 25. *Kendal.* Dalton.
" 27. *Kendal.* Dalton.
" 31. *Stockholm.* Nicander. *Kendal.* Dalton.
Nov. 4. *Kendal.* Dalton.
" 6. *Peissenberg.* Schwaiger.
" 9. *Stockholm.* Nicander.
" 10. *Kendal.* Dalton.
" 11. *Stockholm.* Nicander.
" 14. *Cambridge.* Wigglesworth. Lovering.
" 14. *Salem.* Holyoke. Lovering.
" 14. *Hingham, Mass.* Ware.
" 14. *Stockholm.* Nicander. *St. Petersburg.* Euler.
" 14. *Kendal.* Dalton. *Cuba.* Poey.
" 15. *Beziers.* Betholon.[1] *Sagan.* Preus.
" 15. *Rome.* Calandrelli. *Stockholm.* Nicander.
" 17. *Stockholm.* Nicander.
" 18. *Brussels.* Mann.
" 19. *Sagan.* Preus. *Kendal.* Dalton.
" 20. *Sagan.* Preus.
" 21. *St. Petersburg.* Euler.
" 21. *Stockholm.* Nicander. *Kendal.* Dalton.
" 22. *Stockholm.* Nicander.
" 22. *Sagan.* Preus. *Kendal.* Dalton.
" 24. *Kendal.* Dalton.
" 25. *Stockholm.* Nicander. *Kendal.* Dalton.
" 26. *Stockholm.* Nicander. *Kendal.* Dalton.
" 27. *Stockholm.* Nicander. *Kendal.* Dalton.
" 30. *St. Petersburg.* Euler.
" *x.* *Montmorenci.* Cotte.
Dec. 10. *Sagan.* Preus.
" 13. *Salem.* Holyoke. Lovering.
" 14. *Salem.* Holyoke. Lovering.
" 14. *Sagan?* Preus. *Kendal.* Dalton.
" 15. *Sagan?* Preus.
" 16. *Sagan?* Preus.
" 18. *Cambridge.* Wigglesworth. Lovering.
" 19. *Sagan?* Preus.
" 20. *Peissenberg.* Schwaiger.
" 21. *Stockholm.* Nicander.
" 22. *Mannheim.* Hemmer. *Sagan?* Preus.

[1] Encyc. Method. I. 368.

Dec. 23. *Stockholm.* Nicander.
" 24. *New Haven.* Stiles. Loomis. *Paris.* Cassini.
" 26. *Stockholm.* Nicander.
" 27. *Stockholm.* Nicander.

1790.

Jan. 2. *Stockholm.* Nicander.
" 9. *Sagan.* Preus.
" 10. *Sagan.* Preus.
" 14. *Stockholm.* Nicander. *Kendal.* Dalton.
" 15. *Stockholm.* Nicander.
" 18. *Mannheim.* Hemmer. *Sagan.* Preus.
" 19. *Stockholm.* Nicander.
" 26. *Stockholm.* Nicander.
" 28. *Laon.* Cotte.
" 29. *Mannheim.* Hemmer. *Sagan.* Preus.
" 29. *Jena.* Zeissing. *Prague.* Strnad.
Feb. 1. *Sagan.* Preus.
" 3. *Kendal.* Dalton.
" 8. *Stockholm.* Nicander.
" 9. *Stockholm.* Nicander. *Kendal.* Dalton.
" 10. *Stockholm.* Nicander.
" 11. *Salem.* Holyoke. Lovering.
" 11. *Stockholm.* Nicander.
" 12. *Sagan.* Preus. *Stockholm.* Nicander.
" 12. *Salem.* Holyoke. Lovering.
" 13. *Sagan.* Preus. *Stockholm.* Nicander.
" 14. *Mannheim.* Hemmer. *Stockholm.* Nicander.
" 15. *Sagan.* Preus.
" 18. *Stockholm.* Nicander. *Brussels.* Mann.
" 27. *Stockholm.* Nicander.
Mar. 3. *Mannheim.* Hemmer.
" 7. *Stockholm.* Nicander.
" 8. *Peissenberg.* Schwaiger.
" 8. *Stockholm.* Nicander. *Brussels.* Mann.
" 10. *Stockholm.* Nicander. *Kendal.* Dalton.
" 11. *Stockholm.* Nicander. *Sagan.* Preus.
" 14. *Stockholm.* Nicander.
" 15. *Stockholm.* Nicander.
" 16. *Kendal.* Dalton. *Sagan.* Preus.
" 16. *Stockholm.* Nicander. *Ratisbon.* Heinrich.
" 17. *Sagan.* Preus. *Kendal.* Dalton.
" 17. *Stockholm.* Nicander.
" 18. *Mannheim.* Hemmer. *Kendal.* Dalton.
" 18. *Stockholm.* Nicander.
" 19. *Stockholm.* Nicander. *Kendal.* Dalton.
" 20. *Stockholm.* Nicander. *Kendal.* Dalton.
" 23. *Stockholm.* Nicander.
" 24. *Stockholm.* Nicander.

Apr. 2. *Mannheim.* Hemmer. *Stockholm.* Nicander.
" 3. *Mannheim.* Hemmer. *Kendal.* Dalton.
" 4. *Mannheim.* Hemmer. *Kendal.* Dalton.
" 4. *Stockholm.* Nicander.
" 5. *Kendal.* Dalton.
" 6. *Mannheim.* Hemmer. *Kendal.* Dalton.
" 7. *Kendal.* Dalton.
" 8. *Mannheim.* Hemmer.
" 9. *Sagan.* Preus. *Kendal.* Dalton.
" 9. *Stockholm.* Nicander.
" 10. *Stockholm.* Nicander.
" 11. *Mannheim.* Hemmer.
" 16. *Stockholm.* Nicander. *Kendal.* Dalton.
" 17. *Stockholm.* Nicander. *Kendal.* Dalton.
" 25. *Stockholm.* Nicander.
" 27. *Stockholm.* Nicander.
" 30. *Stockholm.* Nicander. *Brussels.* Mann.
May 1. *Stockholm.* Nicander.
" 1. *St. Petersburg.* Euler.[1]
" 2. *Stockholm.* Nicander.
" 3. *Stockholm.* Nicander.
" 6. *Stockholm.* Nicander.
" 10. *Stockholm.* Nicander.
" 11. *Stockholm.* Nicander.
" 12. *Kendal.* Dalton.
" 14. *Kendal.* Dalton.
" 16. *Salem.* Holyoke. Lovering.
" 16. *Sagan.* Preus. *Peissenberg.* Schwaiger.
" 16. *Kendal.* Dalton. *Prague.* Strnad.
" 17. *Salem.* Holyoke. Lovering.
" 18. *Kendal.* Dalton.
" 24. *Brussels.* Mann.
" 30. *Prague.* Strnad.
June 3. *Salem.* Holyoke. Lovering. *Brussels.* Mann.
" 5. *Brussels.* Mann.
" 8. *Brussels.* Mann.
" 22. *Peissenberg.* Schwaiger.
" 25. *Mannheim.* Hemmer.
" 30. *Salem.* Holyoke. Lovering.
July 1. *Salem.* Holyoke. Lovering.
" 3. *Salem.* Holyoke. Lovering.
" 3. *New Haven.* Stiles. Loomis.
" 13. *Jena.* Zeissing.
" 16. *New Haven.* Stiles. Loomis.
" 16. *Prague.* Strnad. *Sutz.* Sprüngli.
Aug. 3. *Mannheim.* Hemmer.
" 16. *Salem.* Holyoke. Lovering.
" 19. *Berne.* Studer.

[1] Nova Acta. Sci. Acad. Petrop. VIII.

Sept. 6. *New Haven.* Stiles. Loomis.
" 6. *Stockholm.* Nicander.
" 7. *Brussels.* Mann. *Kendal.* Dalton.
" 9. *Sagan.* Preus.
" 13. *Stockholm.* Nicander.
" 16. *St. Petersburg.* Euler.
" 19. *St. Petersburg.* Euler.[1]
" 24. *Sagan.* Preus.
" 30. *Mannheim.* Hemmer. *Sagan.* Preus.
" 30. *Brussels.* Mann. *St. Petersburg.* Euler.
" 30. *Stockholm.* Nicander.
Oct. 1. *Mannheim.* Hemmer. *Stockholm.* Nicander.
" 3. *Stockholm.* Nicander.
" 4. *Sagan.* Preus. *St. Petersburg.* Euler.
" 7. *Pyschminsk, Siberia.* Hermann.[2]
" 9. *Mannheim.* Hemmer. *Kendal.* Dalton.
" 12. *Stockholm.* Nicander.
" 14. *Mannheim.* Hemmer.
" 17. *Stockholm.* Nicander.
" 18. *Keswick.* Dalton.
" 30. *Stockholm.* Nicander.
" 31. *Salem.* Holyoke. Lovering. *Kendal.* Dalton.
Nov. 1. *Stockholm.* Nicander.
" 4. *Sagan.* Preus.
" 5. *Sagan.* Preus.
" 6. *Sagan.* Preus.
" 7. *Kendal.* Dalton.
" 8. *Sagan.* Preus. *Kendal.* Dalton.
" 9. *Mannheim.* Hemmer.
" 9. *Stockholm.* Nicander. *Kendal.* Dalton.
" 10. *Salem.* Holyoke. Lovering.
" 10. *Kendal.* Dalton.
" 11. *Stockholm.* Nicander.
" 12. *Sagan.* Preus. *Kendal.* Dalton.
" 16. *Kendal.* Dalton.
" 17. *Pyschminsk, Siberia.* Hermann.
" 26. *Sagan.* Preus.
" 27. *Kendal.* Dalton.
" 28. *Stockholm.* Nicander.
" 28. *Pyschminsk.* Hermann. *Kendal.* Dalton.
" 29. *Stockholm.* Nicander.
" 30. *Kendal.* Dalton.
Dec. 9. *Stockholm.* Nicander.
" 10. *Stockholm.* Nicander.
" 12. *Stockholm.* Nicander.
" 25. *Kendal.* Dalton.
" 26. *Stockholm.* Nicander.
" 26. *Pyschminsk.* Hermann.

[1] Ephem. Soc. Met. Palat. 1790.
[2] Ephem. Soc. Met. Palat. 1790.

Dec. 28. *Kendal.* Dalton.
" 30. *Sagan.* Preus.

1791.

Jan. 1. *Stockholm.* Nicander.
" 6. *Salem.* Holyoke. Lovering.
" 6. *Kendal.* Dalton.
" 6. *Pyschminsk, Siberia.* Hermann.
" 6. *Brussels.* Mann.
" 6. *Sagan.* Preus. *Stockholm.* Nicander.
" 7. *Sagan.* Preus. *Stockholm.* Nicander.
" 9. *Sagan.* Preus.
" 12. *Salem.* Holyoke. Lovering.
" 12. *Pyschminsk, Siberia.* Hermann.
" 13. *Pyschminsk, Siberia.* Hermann.
" 20. *Mannheim.* Hemmer.
" 25. *Mannheim.* Hemmer.
" 28. *Sagan.* Preus.
" 29. *Sagan.* Preus.
Feb. 21. *Ratisbon.* Heinrich.
" 24. *Sagan.* Preus.
" 25. *Kendal.* Dalton.
" 27. *Sagan.* Preus.
Mar. 2. *Sagan.* Preus.
" 3. *Kendal.* Dalton.
" 5. *Stockholm.* Nicander. *Kendal.* Dalton.
" 7. *Kendal.* Dalton.
" 20. *Mannheim.* Hemmer.
" 22. *Salem.* Holyoke. Lovering.
" 26. *Salem.* Holyoke. Lovering.
" 26. *Kendal.* Dalton.
" 29. *Kendal.* Dalton.
" 31. *Stockholm.* Nicander.
Apr. 1. *Salem.* Holyoke. Lovering.
" 1. *Stockholm.* Nicander.
" 3. *Kendal.* Dalton.
" 4. *Stockholm.* Nicander. *Uhleaborg.* Julin.[1]
" 5. *Salem.* Holyoke. Lovering.
" 13. *Mannheim.* Hemmer.
" 18. *Sagan.* Preus.
" 20. *Kendal.* Dalton.
" 23. *Kendal.* Dalton.
" 25. *Kendal.* Dalton.
May 5. *Padua.* Toaldo and Chiminello.
" 12. *Kendal.* Dalton.
" 20. *Kendal.* Dalton.
" 23. *Brussels.* Mann.
" 26. *Mannheim.* Hemmer. *Brussels.* Mann.

[1] Svenska Vetensk. Acad. XIV. 76. Voigt's Mag. fur. Phys. XI. 3. p. 109.

June 10. *Kendal.* Dalton.
" 19. *Sagan.* Preus.
" 26. *Brussels.* Mann.
July 7. *Mannheim.* Hemmer.
" 20. *Brussels.* Mann.
" 22. *Salem.* Holyoke. Lovering.
" 22. *New Haven.* Stiles. Loomis.
" 23. *Salem.* Holyoke. Lovering.
" 24. *Salem.* Holyoke. Lovering.
" 28. *Salem.* Holyoke. Lovering.
Aug. 15. *Stockholm.* Nicander.
" 18. *Mannheim.* Hemmer.
" 20. *Mannheim.* Hemmer.
Sept. 5. *Stockholm.* Nicander. *Kendal.* Dalton.
" 8. *Kendal.* Dalton.
" 11. *Stockholm.* Nicander. *Kendal.* Dalton.
" 13. *Kendal.* Dalton.
" 15. *Mannheim.* Hemmer.
" 17. *Pyschminsk, Siberia.* Hermann.
" 19. *Stockholm.* Nicander.
" 22. *Stockholm.* Nicander.
" 24. *Stockholm.* Nicander.
" 27. *Kendal.* Dalton.
" 28. *Stockholm.* Nicander.
" 28. *Brussels.* Mann. *Kendal.* Dalton.
" 30. *Stockholm.* Nicander.
Oct. 1. *Stockholm.* Nicander.
" 2. *Munich.* Imhof.
" 6. *Sagan.* Preus.
" 15. *Kendal.* Dalton.
" 19. *Kendal.* Dalton.
" 20. *Kendal.* Dalton.
" 21. *Brussels.* Mann.
" 22. *Brussels.* Mann. *Kendal.* Dalton.
" 23. *Sagan.* Preus. *Kendal.* Dalton.
" 28. *Prague.* Strnad.
" 29. *Stockholm.* Nicander. *Kendal.* Dalton.
" 31. *Kendal.* Dalton.
Nov. 3. *Kendal.* Dalton.
" 4. *Kendal.* Dalton.
" 5. *Kendal.* Dalton.
" 8. *Mannheim.* Hemmer.
" 11. *Kendal.* Dalton.
" 14. *Kendal.* Dalton.
" 16. *Sagan.* Preus.
" 17. *Kendal.* Dalton.
" 18. *Brussels.* Mann. *Kendal.* Dalton.
" 19. *Sagan.* Preus. *Stockholm.* Nicander.
" 19. *Montreal.*[1]

[1] Mem. Amer. Acad. II. 114.

Dec. 13. *Kendal.* Dalton.
" 17. *Stockholm.* Nicander.
" 19. *Kendal.* Dalton.
" 23. *Brussels.* Mann.
" 26. *New Haven.* Stiles. Loomis.
" 26. *Brussels.* Mann. *Kendal.* Dalton.
" 27. *Salem.* Holyoke. Lovering.
" 27. *New Haven.* Stiles. Loomis. *Sagan.* Preus.
" 28. *Brussels.* Mann.
" 29. *Brussels.* Mann.

1792.

Jan. 9. *Kendal.* Dalton.
" 16. *Sagan.* Preus.
" 17. *Kendal.* Dalton.
" 18. *Sagan.* Preus. *Kendal.* Dalton.
" 24. *Montreal.*[1]
" 25. *Sagan.* Preus.
" 30. *Brussels.* Mann.
Feb. 5. *Stockholm.* Nicander.
" 9. *Kendal.* Dalton.
" 14. *Stockholm.* Nicander.
" 16. *Stockholm.* Nicander.
" 17. *Stockholm.* Nicander. *Kendal.* Dalton.
" 24. *Stockholm.* Nicander.
" 26. *Stockholm.* Nicander.
" 28. *Stockholm.* Nicander.
Mar. 2. *Kendal.* Dalton.
" 5. *Mount St. Andex, Bavaria.* Hochholzer.
" 12. *Stockholm.* Nicander.
" 15. *Kendal.* Dalton.
" 16. *Sagan.* Preus.
" 19. *Sagan.* Preus.
" 20. *Stockholm.* Nicander.
" 25. *Sagan.* Preus.
" 27. *Mannheim.* Hemmer.
" 30. *Stockholm.* Nicander.
" 31. *Mannheim.* Hemmer.
Apr. 10. *Kendal.* Dalton. *Isserstädt.* Zeissing.
" 10. *Sagan.* Preus. *Stockholm.* Nicander.
" 10. *Montmorenci.* Cotte.[2]
" 11. *Sagan.* Preus. *Stockholm.* Nicander.
" 11. *Kendal.* Dalton.
" 12. *Sagan.* Preus.
" 13. *Mannheim.* Hemmer.
" 14. *Sagan.* Preus.
" 16. *Mannheim.* Hemmer. *Kendal.* Dalton.
" 17. *Stockholm.* Nicander.

[1] Mém. Amer. Acad. II. 115.
[2] Journ. de Phys. XL. 450.

May 4. *Stockholm.* Nicander.
" 6. *Kendal.* Dalton.
" 7. *Stockholm.* Nicander.
" 8. *Brussels.* Mann.
" 9. *Sagan.* Preus.
" 14. *Sagan.* Preus.
" 15. *Mannheim.* Hemmer.
" 20. *Brussels.* Mann.
" 22. *Montmorenci.* Cotte.
" 27. *Brussels.* Mann.
June 2. *Sagan.* Preus.
" 30. *Kendal.* Dalton.
July 7. *Salem.* Holyoke. Lovering.
" 11. *Salem.* Holyoke. Lovering.
" 18. *Salem.* Holyoke. Lovering.
" 19. *Brussels.* Mann.
Aug. 2. *Mount St. Andex, Bavaria.* Hochholzer.
" 4. *Kendal.* Dalton.
" 17. *Mount St. Andex, Bavaria.* Hochholzer.
" 23. *Kendal.* Dalton.
" 27. *St. Petersburg.* Euler.[1]
Sept. 1. *Mannheim.* Hemmer.
" 6. *Mannheim.* Hemmer.
" 14. *Mannheim.* Hemmer.
" 22. *Kendal.* Dalton.
" 28. *Mannheim.* Hemmer.
Oct. 2. *Stockholm.* Nicander.
" 12. *Kendal.* Dalton.
" 13. *Salem.* Holyoke. Lovering.
" 13. *New Haven.* Stiles. Loomis. *Kendal.* Dalton.
" 13. *New Haven.* Stiles. Loomis. *Sagan.* Preus.
" 13. *Isserstädt.* Zeissing. *St. Petersburg.* Euler.
" 13. *Marseilles.* St. Jacques. *Brussels.* Mann.
" 14. *Salem.* Holyoke. Lovering.
" 14. *Sagan.* Preus. *Kendal.* Dalton.
" 15. *Sagan.* Preus.
" 16. *Sagan.* Preus.
" 17. *Sagan.* Preus.
" 18. *Sagan.* Preus. *Kendal.* Dalton.
" 19. *Stockholm.* Nicander.
" 23. *Kendal.* Dalton.
" 31. *Kendal.* Dalton.
Nov. 7. *Stockholm.* Nicander.
" 13. *Sagan.* Preus.
" 14. *Sagan.* Preus.
" 17. *Stockholm.* Nicander.
" 29. *Kendal.* Dalton.
Dec. 2. *Moscow.* Stritter.[2]

[1] Nova Acta. Sci. Acad. Petrop. X. 505.
[2] Nova Acta. Sci. Acad. Petrop. X. 505.

Dec. 7. *Keswick.* Dalton.
" 12. *Padua.* Toaldo and Chiminello.
" 13. *Moscow.* Stritter.
" 15. *Salem.* Holyoke. Lovering.
" 30. *Sagan.* Preus.

1793.

Jan. 11. *Kendal.* Dalton.
" 12. *Salem.* Holyoke. Lovering. *Kendal.* Dalton.
" 13. *Salem.* Holyoke. Lovering. *Kendal.* Dalton.
" 14. *New Haven.* Stiles. Loomis.
" 14. *Pyschminsk, Mt. Oural, Siberia.* Hermann.[1]
Feb. 8. *Kendal.* Dalton.
" 12. *Kendal. Dalton.*
" 15. *Kendal.* Dalton. Thompson.
Mar. 5. *Kendal.* Dalton.
" 6. *Kendal.* Dalton.
" 13. *Cambridge.* Wigglesworth. Lovering.
" 13. *Salem.* Holyoke. Lovering. *Kendal.* Dalton.
" 30. *Kendal.* Dalton.
Apr. 5. *Kendal.* Dalton.
" 9. *Kendal.* Dalton.
" 14. *Kendal.* Dalton.
June 9. *Montmorenci.* Cotte.[2]
Aug. 6. *Salem.* Holyoke. Lovering.
" 26. *Montmorenci.* Cotte.
" 28. *Salem.* Holyoke. Lovering.
" 28. *St. Petersburg.* Euler.[3]
Sept. 2. *Salem.* Holyoke. Lovering.
" 2. *New Haven.* Stiles. Loomis.
" 4. *Cambridge.* Wigglesworth. Lovering.
Oct. 20. *St. Petersburg.* Euler.
Nov. 8. *Isserstädt.* Zeissing.

1794.

Jan. 7. *G. Britain or Ireland.* Dalton.[4]
" 22. *G. Britain or Ireland.* Dalton.
Mar. 8. *G. Britain or Ireland.* Dalton.
" 29. *G. Britain or Ireland.* Dalton.
Apr. 2. *St. Petersburg.* Euler.[5]
" 3. *St. Petersburg.* Euler.
" 30. *Salem.* Holyoke. Lovering.
" 30. *Montmorenci.* Cotte.[6]
Nov. 11. *New Haven.* Stiles. Loomis.
Dec. 8. *G. Britain or Ireland.* Dalton.

[1] Nova Acta Sci. Acad. Petrop. XI. 562.
[2] Journ. de Phys. XLIII. 46, &c.
[3] Nova Acta Sci. Acad. Petrop. XI. 562.
[4] Met. Observ. and Essays, p. 218.
[5] Nova Acta Sci. Acad. Petrop. XII. 524.
[6] Journ. de Phys. XLIV. 297.

Dec. 19. *G. Britain or Ireland.* Dalton.

1795.

Mar. 11. *St. Petersburg.* Euler.[1]
May 24. *Salem.* Holyoke. Lovering.
Sept. 8. *G. Britain or Ireland.* Dalton.
" 14. *G. Britain or Ireland.* Dalton.
Oct. 3. *St. Petersburg.* Euler.
" 14. *Salem.* Holyoke. Lovering.
" 18. *G. Britain or Ireland.* Dalton.

1796.[2]

Feb. 6. *St. Petersburg.* Euler.
Apr. 6. *Isserstädt.* Zeissing.

1797.

Jan. 22. *G. Britain or Ireland.* Dalton.
Feb. 1. *G. Britain or Ireland.* Dalton.
" 10. *St. Petersburg.* Euler.[3]
" 18. *G. Britain or Ireland.* Dalton.
" 27. *G. Britain or Ireland.* Dalton.
" 28. *G. Britain or Ireland.* Dalton.
Mar. 1. *G. Britain or Ireland.* Dalton.
" 2. *G. Britain or Ireland.* Dalton.
" 10. *G. Britain or Ireland.* Dalton.
Apr. 24. *G. Britain or Ireland.* Dalton.
Nov. 18. *G. Britain or Ireland.* Dalton.
" 21. *G. Britain or Ireland.* Dalton.
" 22. *G. Britain or Ireland.* Dalton.
" 23. *G. Britain or Ireland.* Dalton.

1798.

Jan. 15. *Montmorenci.* Cotte.
Feb. 10. *Abo, Finland.* Hällström.[4]

1799.

Jan. 22. *St. Petersburg.* Euler.[5]
Feb. 10. *Scotland.* Graham. Boué.[6]
" 25. *Eckwarden.* Brandes.[7]
July 23. *Paris.* Bouvard.[8]
Sept. 3. *G. Britain or Ireland.* Dalton.
" 3. *Paris.* Bouvard.

[1] Nova Acta Sci. Acad. Petrop. XIII. 582.
[2] None in England or the United States of America this year.
[3] Nova Acta Sci. Acad. Petrop. XIV. 795.
[4] Gilbert Annal. XVIII. 74.
[5] Nova Acta Sci. Acad. Petrop. XV. 563.
[6] Trans. Roy. Soc. Edinb. V. 25.
[7] Gilbert Annal. XXIV. 363.
[8] Journ. de Phys.

Oct. 25. *G. Britain or Ireland.* Dalton.

1800.

Nov. 2. *G. Britain or Ireland.* Dalton.
" 7. *G. Britain or Ireland.* Dalton.
Dec. 10. *G. Britain or Ireland.* Dalton.

1801.

Jan. 4. *G. Britain or Ireland.* Dalton.
" 25. *G. Britain or Ireland.* Dalton.
Feb. 22. *G. Britain or Ireland.* Dalton.
Oct. 6. *G. Britain or Ireland.* Dalton.
" 11. *Abo.* Hällström.[1] Muncke[2] and Quetelet.[3]
" 12. *Abo.* Hällström. Muncke and Quetelet.
" 15. *Abo.* Hällström. Boué.
Dec. 5. *Edinburgh.* Brewster.[4] Muncke and Quetelet.

1802.

Jan. 2. *Sweden.* Hällström. Muncke and Quetelet.
Feb. 3. *G. Britain or Ireland.* Dalton.
Mar. 6. *Sweden.* Hällström. Muncke and Quetelet.
" 29. *G. Britain or Ireland.* Dalton.
" 29. *Sweden.* Hällström. Muncke and Quetelet.
" *x.* *St. Petersburg.* Euler.[5]
Apr. 10. *Sweden.* Hällström. Boué.
" 16. *Sweden.* Hällström. Muncke and Quetelet.
" 29. *Sweden.* Hällström. Muncke and Quetelet.
June 16. *Salem.* Holyoke. Lovering.
July 1. *New Haven.* Dwight. Loomis.
Sept. 19. *Schaageragt. Lat.* 57.° *Long.* 8.° Horner.
" 19. Muncke and Quetelet.
" 27. *G. Britain or Ireland.* Dalton.
Dec. 13. *G. Britain or Ireland.* Dalton.

1803.

Jan. 13. *New Haven.* Dwight. Loomis.
Mar. 19. *Salem.* Holyoke. Lovering.
" 19. *Paris.* Bouvard.
" 19. *New Haven.* Leffingwell. Loomis.
Apr. 12. *G. Britain or Ireland.* Dalton.
" 13. *G. Britain or Ireland.* Dalton.
Aug. 23. *Salem.* Holyoke. Lovering.
Sept. 11. *G. Britain or Ireland.* Dalton.
Sept. 17. *Salem.* Holyoke. Lovering.
" 17. *G. Britain or Ireland.* Dalton.
" 19. *Salem.* Holyoke. Lovering.
" 19. *New Haven.* Leffingwell. Loomis.
Oct. 12. *G. Britain or Ireland.* Dalton.
Dec. 3. *G. Britain or Ireland.* Dalton.

1804.

Feb. 2. *G. Britain or Ireland.* Dalton.
Mar. 29. *Paris.* Bouvard.
Apr. 1. *Salem.* Holyoke. Lovering.
" 1. *New Haven.* Day. Loomis.
" 1. *G. Britain or Ireland.* Dalton.
" 4. *G. Britain or Ireland.* Dalton.
May 2. *Salem.* Holyoke. Lovering.
" 2. *New Haven.* Day. Loomis.
" 2. *G. Britain or Ireland.* Dalton.
" 12. *Salem.* Holyoke. Lovering.
Sept. 7. *St. Petersburg.* Inochodzow.[1]
Oct. 12. *Schnepfenthal.*[2] Ausfeld.
" 22. Muncke and Quetelet.
" 22. *St. Petersburg.* Inochodzow.
" 22. *Paris.* Bouvard.
" 22. *Berlin.* Wrede. *Halle.* Gilbert.[3]
" 22. *Leipsic.* Mollweide. London.[4]
" 22. *Paris.* Lamark. Quetelet.
" 22. *Dorpat.* Parrot.[5]
" 22. *Petersburg, Königsberg, Brügge, &c.* Muncke.
Nov. 5. *Salem.* Holyoke. Lovering.
" 22. *G. Britain or Ireland.* Dalton.
" 25. *G. Britain or Ireland.* Dalton.

1805.

Jan. 1. *St. Petersburg.* Inochodzow.
" 1. *Carlisle.* Pitt. Muncke.
" 1. *G. Britain or Ireland.* Dalton. Quetelet.
" 4. *Salem.* Holyoke. Lovering.
Feb. 23. *G. Britain or Ireland.* Dalton.
" 23. *Manchester.* Muncke and Quetelet.[6]
Mar. 26. *Carlisle.* Pitt. Quetelet.[7]
Apr. 30. *G. Britain or Ireland.* Dalton.
May 27. ——— Muncke.[8] Quetelet.

[1] Gilbert. Ann. XVIII. 75.
[2] Gehler. Physikal. Wörterbuch. VII. 138
[3] Nouveaux Mém. de l'Acad. Brux. XII. 61.
[4] Edin. Journ. Sci. V. 74.
[5] Mém. de l'Acad. St. Petersb. III. 346.
[1] Mém. de l'Acad. St. Petersb. III. 436.
[2] Gilbert. Ann. XIX. 108.
[3] Gilbert. Ann. XVIII. 252. XIX. 106.
[4] Phil. Trans. 1805, Pt. I. Meteor. Journ. p. 21.
[5] Edin. New Phil. Journ. I. 157.
[6] Nicholson's Journ. &c. X. 303.
[7] Gilbert. Ann. XIX. 219.
[8] Gehler. Physikal. Worterbuch, VII. 138.

May 28. ——— Muncke. Quetelet.
Aug. 29. *Milnegraden.* Muncke. Quetelet.[1]
Sept. 15. *Salem.* Holyoke. Lovering.
" 15. *New Haven.* Day. Loomis.
" 21. ——— Muncke. Quetelet.
" 22. ——— Muncke. Quetelet.
" 24. *New Haven.* Day. Loomis.
" 24. *St. Petersburg.* Inochodzow.[2] *Paris.* Bouvard.
" 24. *G. Britain or Ireland.* Dalton.
Oct. 13. ——— Muncke. Quetelet.
" 20. ——— Muncke. Quetelet.
" 22. ——— Muncke. Quetelet.
Nov. 16. ——— Muncke. Quetelet.
" 18. *Salem.* Holyoke. Lovering.
" 18. ——— Muncke. Quetelet.
" 19. ——— Muncke. Quetelet.
" 20. ——— Muncke. Quetelet.
" 25. ——— Muncke. Quetelet.
" 26. ——— Muncke. Quetelet.
Dec. 26. ——— Muncke. Quetelet.

1806.

Jan. 11. *New Haven.* Day. Loomis.
Feb. 7. *G. Britain or Ireland.* Dalton.
Mar. 16. *New Haven.* Day. Loomis.
Apr. 13. *Salem.* Holyoke. Lovering.
Aug. 9. *St. Petersburg.* Inochodzow.
Sept. 10. *G. Britain or Ireland.* Dalton.
Oct. 2. *Eckwarden.* Brandes.[3]
" 5. *Salem.* Holyoke. Lovering.
Nov. 2. *G. Britain or Ireland.* Dalton.
" 2. *Eckwarden.* Brandes. Muncke and Quetelet.
Dec. 22. *Halle.* Gilbert. Muncke.
" 22. *Paris.* Quetelet.[4]

1807.

Jan. 13. *Halle.* Gilbert. Muncke and Quetelet.[5]
Mar. 26. *Border of Norway and Sweden.* Hausmann.[6]
" 26. Muncke and Quetelet.
Apr. 11. *New Haven.* Day. Loomis.
" 15. *Lat.* 66° *N. Long.* 6° *W.* Scoresby.[7]
May 8. *New Haven.* Day. Loomis.

[1] Ferussac. Bull. Univ. IX.
[2] Mém. de l'Acad. St. Petersb. IV. 490.
[3] Gilbert. Ann. XXIV. 363.
[4] Gilbert. Ann. XXIV. 363. XXIX. 428.
[5] Gilbert. Ann. XXIV. 365.
[6] Reise Durch. Skandin. V. 259.
[7] Arctic Regions. I. 417.

1808.

Mar. 8. *G. Britain or Ireland.* Dalton.
July 23. *St. Petersburg.* Petrow.[1]
" 31. *Road from Leipsic to Halle.* Gilbert.[2]

1809.

Jan. 31. *Salem.* Holyoke. Lovering.
Mar. 19. *Lat.* 59° *N. Long.* 1° *W.* Scoresby.
June 13. *Salem.* Holyoke. Lovering.

1810.

Apr. 4. *Lat.* 71° *N. Long.* 3° *E.* Scoresby.

1811.

Mar. 28. *Lat.* 67° *N. Long.* 2° *E.* Scoresby.
" 29. *Lat.* 67° *N. Long.* 3° *E.* Scoresby.
" 30. *Lat.* 68° *N. Long.* 4° *E.* Scoresby.
" 31. *Lat.* 67° *N. Long.* 4° *E.* Scoresby.

1814.

Jan. 31. *Salem.* Holyoke. Lovering.
Apr. 7. *Tottenham.* Howard. Muncke and Quetelet.
" 14. *G. Britain or Ireland.* Dalton.
" 17.[4] *Salem.* Holyoke. Lovering.
" 17. *New Haven.* Day. Loomis.
" 17. *Cincinnati.*[5] Drake.
Sept. 10.[6] *G. Britain or Ireland.* Dalton.
" 11. *Salem.* Holyoke. Lovering.
" 11. *New Haven.* Day. Loomis.
" 11. *Cincinnati.* Drake.
" 11. *G. Britain or Ireland.* Dalton.
" 11. *Glasgow.* Dobbie.[7]
Oct. 22. *Berne.* Studer.[8]

[1] Mém. de l'Acad. St. Petersb. VI. 682.
[2] Gilbert. Ann. XXX. 243. Doubtful whether this was an aurora.
[3] Gilbert. Ann. LI. 72.
[4] In Gilbert. Ann. LI. 72, an aurora is mentioned as occurring on April 11th or 17th.
[5] Drake's Picture of Cincinnati. pp. 245–6.
[6] The aurora was constantly observed at York Factory from Aug. 31st to Sept. 28th. Smith. Contrib. VIII. Record of Auroral Phenom. &c. Force. p. 9. Chappel remarks: "During our stay in Hudson's Bay from Aug. 31st to Sept. 28th, 1814, and upon our voyage home from thence, our nights were constantly illuminated by brilliant auroras." p. 136.
[7] Phil. Mag. LVI. 175.
[8] Mitth. Naturforsch. Gesellsch. Bern. 1855. p. 45.

1815.[1]

Apr. 5. *Lat.* 69° *N. Long.* 2°. Scoresby.
" 6. *Lat.* 70° *N. Long.* 3°. Scoresby.
" 7. *Lat.* 70° *N. Long.* 4°. Scoresby.

1816.

Sept.15. *G. Britain or Ireland.* Dalton.
" 24. *Glasgow.* Dobbie.[2]
" 26. *Salem.* Holyoke. Lovering.
Oct. 7. *Christiania.* Hansteen.[3]
" 7. Muncke, Quetelet, and Biot.[4]

1817.

Feb. 6. *Paris.* Muncke. Quetelet.[5]
" 8. *Leipsic.* Mollweide.[6] ——— Schubler.[7]
" 8. *G. Britain or Ireland.* Dalton.
" 8. *Sunderland.* Pensey.[8] *Gosport.* Burney.
" 8. *London, Leeds, and Derby.*[9]
" 8. *Berne.* Watt. Studer.[10]
" 8. *Christiania.* Hansteen. Biot. *Germany.*[11]
" 8. *Paris.* Muncke and Quetelet.
" 9. *Königsberg.* Muncke and Quetelet.
" 9. *Leipsic.* Mollweide.[12]
" 11. *Stockholm.* Muncke and Quetelet.
" 18. *Hamm.* Gronau. Muncke and Quetelet.[13]
" 20. *Walthamstow.*[14]
Mar. 4. *Carlsruhe.* Studer.
" 5. *Gordon Castle.* Hoy. *Glasgow.*[15]
" 15. *Stockholm.*[16]
" 16. *Stockholm.*[17]
" 29. *Atlantic Ocean.* O'Reilly.[18]
" 30. *Atlantic Ocean.* O'Reilly.

[1] Henderson says of Iceland in the winter of 1814–15, "that the aurora was seen almost every clear night in winter. p. 577.
[2] Phil. Mag. LVI. 175.
[3] Schweigg. Journ. XVI. 196. Edin. Phil. Journ. XII. 88.
[4] Journ. de Phys. XCIII. 15.
[5] Ann. Chem. et Phys. VI. 443.
[6] Gilbert. Ann. LV. 248.
[7] Journ. de Phys. LXXXV. 29. Schweigg. Journ. XIX. 1.
[8] Annals of Phil. IX. 250 and XI. 168.
[9] Phil. Mag. XLIX. 223.
[10] Bib. Univ. IV. 158.
[11] Phil. Mag. XLIX. 236. Edin. Phil. Journ. XII. 88.
[12] Gilbert. Ann. LV. 248.
[13] Berlin Gesellsch Naturforsch. 1820, p. 128.
[14] Phil. Mag. XLIX. 237.
[15] Phil. Mag. LI. 422.
[16] Amer. Journ. Sci. XVI.
[17] Amer. Journ. Sci. XVI.
[18] Voyage to Davis's Straits, &c. p. 29.

Apr. 5. *Zetland.* Scoresby.
" 8. *Near Davis's Straits.* O'Reilly.
" 8. *Lat.* 65° *N. Long.* 1° *E.* Scoresby.
" 16. *Near Davis's Straits.* O'Reilly.
" 22. *Lat.* 62° *N. Long.* ½° *W.* Scoresby.
" 23. *Lat.* 62° *N. Long.* 2° *E.* Scoresby.
Aug. 27. *Unst, Shetland.* Biot, Muncke, and Quetelet.[1]
Sept. 6. *Unst.* Biot.[2]
" 19. *Glasgow.* Dupin. Muncke and Quetelet.[3]
" 19. *Gosport.* Burney.[4]
Oct. 17. *Gosport.* Burney.[5]

1818.

Feb. 5. *Gordon Castle.* Hoy.[6]
May 20. *Lat.* 77° *N. Long.* 1°. Scoresby.
" 23. *Williamstown, Mass.* Dewey.[7]
" 28. *Williamstown, Mass.* Dewey.
June 6. *Williamstown, Mass.* Dewey.
" 6. *New Haven.* Day. Loomis.
" 7. *Williamstown, Mass.* Dewey.
" 8. *Williamstown, Mass.* Dewey.
" 9. *Williamstown, Mass.* Dewey.
" 10. *Williamstown, Mass.* Dewey.
Sept.20. *New Haven.* Day. Loomis.
" 23. *At sea, Lat.* 66° *N. Long.* 59° *W.* Robertson.[8]
" 24. *Williamstown, Mass.* Dewey.
" 25. *Williamstown, Mass.* Dewey.
" 26. *Boston.* Hale. Lovering.[9]
" 26. *New Haven.* Day. Loomis.
" 26. *At sea, Lat.* 65° *N. Long.* 61° *W.* Robertson.
" 27. *Salem.* Holyoke. Lovering.
" 28. *At sea, Lat.* 65° *N. Long.* 63° *W.* Robertson.
" 29. *At sea, Lat.* 65° *N. Long.* 63° *W.* Robertson.
Oct. 1. *At sea, Lat.* 62° *N. Long.* 63° *W.* Robertson.
" 6. *Williamstown, Mass.* Dewey.
" 6. *At sea, Lat.* 60° *N. Long.* 56° *W.* Robertson.
" 7. *Williamstown, Mass.* Dewey.
" 8. *Lat.* 59° *N. Long.* 50° *W.* Robertson.
" 17. *Lat.* 61° *N. Long.* 25° *W.* Robertson.
" 26. *G. Britain or Ireland.* Dalton.
" 31. *G. Britain or Ireland.* Dalton.

[1] Journ. de Phys. XCIII. 15.
[2] Journ. de Savans. 1820.
[3] Phil. Mag. LI. 47. Bib. Univ. VII. 68.
[4] Annals of Phil. XI. 168.
[5] Annals of Phil. XIV. 395.
[6] Phil. Mag. LI. 422.
[7] Mem. Amer. Acad. IV. 391.
[8] Ross's Voyage of Discovery, &c. Appendix, p. 120.
[9] Mem. Amer. Acad. IX. 119.

Oct. 31. Muncke, Aràgo, and Quetelet.[1]
" 31. *Near Sunderland.* Rennie.[2]

1819.[3]

Feb. 1. *Paris?* Arago.
" 19. *Boston.* Hale. Lovering.
" 19. *Salem.* Holyoke. Lovering.
" 19. *New Haven.* Day. Loomis. *Aberdeenshire.*[4]
Mar. 25. *Boston.* Hale. Lovering.
" 25. *Salem.* Holyoke. Lovering.
" 26. *Salem.* Holyoke. Lovering.
Aug. 4. *At sea, Lat.* 59° *N. Long.* 59° *W.* Franklin.[5]
Sept. 20.[6] *At sea, Lat.* 74° *N. Long.* 111° *W.* Parry.[7]
" 24. *Upper Portage, Lat.* 55° *N. L'g.* 94°. Franklin.
Oct. 3. *Zurich.* Gilbert.[8]
" 6. ——— Gilbert.[9]
" 7. *Flensburg, Sweden.* Boué.[10]
" 8. *Lake Winnepeg.* Franklin.
" 12. *Boston.* Hale. Lovering.
" 12. *New Haven.* Day. Loomis.
" 12. *G. Britain or Ireland.* Dalton.
" 13. *Cedar Lake, Lat.* 53° *N. L'g.* 100°. Franklin.
" 13. *Winter Harbor.* Parry.
" 15. *Suffolk.* Forster.
" 15. *Barton Mills.* Muncke, Arago, and Quetelet.[11]
" 17. *Gosport.* Burney. *Scotland.* Forster.[12]
" 17. *G. Britain or Ireland.* Dalton.
" 17. *Near Diss.* Muncke, Arago, and Quetelet.[13]
" 20. *Winter Harbor.* Parry. Arago.
" 27. *Winter Harbor.* Fisher. Parry.
" 31. *Gosport.* Burney.[14]
Nov. 9. *Winter Harbor.* Parry.

[1] Oeuvres de Arago. IV. 607. Annals of Phil. XIII. 71.
[2] Ann. Chem. et Phys. X. 123..
[3] Auroras were seen at Williamstown, by Dewey, on fourteen evenings during this year, six of which were in October.
[4] Quart. Journ. Sci. VII. 188.
[5] Narrative of a Journey, &c. p. 12.
[6] Hood states that the number of auroras visible at Cumberland House in Lat. 54° N. and Long. 102° W. was, in September, 1819, *two;* in October, *three;* in November, *three;* in December, *five;* in January, 1820, *five;* in February, *seven;* in March, *sixteen;* in April, *fifteen;* and in May, *eleven.*
[7] Parry's Journal of a voyage, p. 93.
[8] Gilbert. Ann. LXVI. 422.
[9] Gilbert. Ann. LXVI. 423.
[10] Quart. Journ. Sci. IX. 210.
[11] Phil. Mag. LIV. 390.
[12] Annals of Phil. XIV. 395.
[13] Phil. Mag. LIV. 390.
[14] Ann. Phil. XIII. 444.

Nov. 12. *Winter Harbor.* Parry. Arago.
" 13. *Boston.* Hale. Lovering.
" 13. *Salem.* Holyoke. Lovering.
" 13. *New Haven.* Day. Loomis.
" 13. *Winter Harbor.* Parry. Arago.
" 14. *Salem.* Holyoke. Lovering.
" 15. *Cumberland House.* Franklin.
" 15. *Winter Harbor.* Parry. Arago.
" 16. *Winter Harbor.* Parry. Arago.
" 17. *Winter Harbor.* Parry. Arago.[1]
" 18. *Winter Harbor.* Parry. Arago.
" 23. *Cumberland House.* Franklin.
" 26. *Cumberland House.* Franklin.
" 26. *Winter Harbor.* Parry. Arago.
" 28. *Cumberland House.* Franklin.
Dec. 6. *Cumberland House.* Franklin.
" 8. *Cumberland House.* Franklin.
" 9. *Cumberland House.* Franklin.
" 12. *Cumberland House.* Franklin.
" 14. *Winter Harbor.* Parry.
" 14. Muncke, Arago, and Quetelet.
" 14. *G. Britain or Ireland.* Dalton.
" 17. *Winter Harbor.* Parry. Arago and Quetelet.
" 19. *Winter Harbor.* Parry. Arago and Quetelet.
" 20. *Winter Harbor.* Parry. Arago and Quetelet.

1820.

Jan. 5. ——— Arago.[2]
" 8. *Winter Harbor.* Parry. Arago.
" 11. *Winter Harbor.* Parry. Arago.
" 14. *G. Britain or Ireland.* Dalton.
" 14. Arago, Muncke, and Quetelet.
" 14. *Cumberland House.* Franklin.
" 15. *Winter Harbor.* Parry.[3]
" 19. *Cumberland House.* Franklin.
" 20. *Cumberland House.* Franklin.
" 27. *Cumberland House.* Franklin.
Feb. 2. *Cumberland House.* Franklin.
" 3. *Winter Harbor.* Parry. Arago.
" 8. *Cumberland House.* Franklin.
" 8. *Winter Harbor.* Parry. Arago.
" 9. *Paris?* Arago.
" 10. *Cumberland House.* Franklin.
" 10. *Winter Harbor.* Parry. Arago.
" 11. *G. Britain or Ireland.* Dalton. Arago.
" 12. *Cumberland House.* Franklin.
" 19. *Cumberland House.* Franklin. Arago.

[1] Fisher's Journal of a voyage, &c. p. 156.
[2] Probably a mistake for Jan. 15.
[3] Edin. Phil. Journ. V. 204.

Feb. 29. *Winter Harbor.* Parry.
" 29. *Cumberland House.* Parry.
Mar. 4. *Cumberland House.* Franklin.
" 4. *Fort Isle la Croise.* Franklin.
" 4. *Winter Harbor.* Parry.
" 5. *Cumberland House.* Franklin.
" 6. *Cumberland House.* Franklin.
" 7. *Cumberland House.* Franklin.
" 8. *Winter Harbor.* Parry. Arago.
" 8. *Cumberland House.* Franklin.
" 9. *Cumberland House.* Franklin.
" 10. *Cumberland House.* Franklin.
" 11. *Cumberland House.* Franklin.
" 12. *Cumberland House.* Franklin.
" 14. *Cumberland House.* Franklin.
" 15. *Cumberland House.* Franklin.
" 16. *Cumberland House.* Franklin.
" 17. *Cumberland House.* Franklin.
" 18. *Cumberland House.* Franklin.
" 19. *Cumberland House.* Franklin.
Apr. 2.[1] *Cumberland House.* Richardson.
" 3. *Boston.* Hale. Lovering.
" 3. *Salem.* Holyoke. Lovering.
" 3. *Cambridge, N. Y.* Joslin.
" 3. *Fort Chippewyan.* Franklin. Arago.
" 3. *East Greenland.* Scoresby.[2]
" 3. Muncke and Quetelet.
" 6. *Cumberland House.* Richardson.
" 7. *Cumberland House.* Richardson.
" 10. *Cumberland House.* Richardson.
" 12. *Cumberland House.* Richardson.
" 14. *Cumberland House.* Richardson.
" 15. *Cumberland House.* Richardson.
" 16. *Cumberland House.* Richardson.
" 17. *Fort Chippewyan.* Franklin.
" 19. *Fort Chippewyan.* Franklin.
" 19. *Cumberland House.* Franklin.
" 20. *Cumberland House.* Franklin.
" 27. *Cumberland House.* Franklin.
" 29. *Cumberland House.* Franklin.
" 30. *Cumberland House.* Franklin.
May 1. *New Haven.* Day. Loomis.
" 1. *Cumberland House.* Franklin.
" 2. *Cumberland House.* Franklin.
" 2. *Fort Chippewyan.* Franklin.
" 3. *Cumberland House.* Franklin.
May 5. *Cumberland House.* Franklin.
" 12. *Cumberland House.* Franklin.
" 18. *Cumberland House.* Franklin.
" 23. *Cumberland House.* Franklin.
" 28. *Cumberland House.* Franklin.
June 16. *Fort Chippewyan.* Franklin.
Aug. 14. *Hunter's Portage.* Franklin.
" 18. *Near Fort Enterprize.* Franklin.
Sept. 12. *At sea, Lat.* 68° *N. Long.* 66° *W.* Parry.
" 13. *At sea, Lat.* 68° *N. Long.* 60° *W.* Fisher.[3]
" 17. *Akur Eyri in Iceland.* Thienemann.[2]
Oct. 2. *At sea, Lat.* 57° *N. Long.* 49° *W.* Parry.
" 3.[3]. *At sea, L.* 57° *N. Lg.* 45° *W.* Parry. Arago.[4]
" 12. *Akur Eyri.* Thienemann.
" 13. *At sea, L.* 60° *N. Lg.* 25° *W.* Parry. Arago.
" 27. *Akur Eyri.* Thienemann.
" 31. *Akur Eyri.* Thienemann.
Nov. 6. *Akur Eyri.* Thienemann.
" 9. *Akur Eyri.* Thienemann.
" 11. *Akur Eyri.* Theinemann.
" 13. *Fort Enterprize.* Richardson.
" 14. *Akur Eyri.* Thienemann.
" 24. *Fort Enterprize.* Richardson.
" 24. *Akur Eyri.* Thienemann.
" 26. *Fort Enterprize.* Richardson.
" 26. *Akur Eyri.* Thienemann.
" *x. St. Petersburg.* Muncke.[5]
Dec. 1. *Fort Enterprize.* Richardson
" 2. *Akur Eyri.* Thienemann.
" 3. *Akur Eyri.* Thienemann.
" 4. *Akur Eyri.* Thienemann.
" 4. *Fort Enterprize.* Richardson.
" 4. *England.* Forster.[6] Arago.
" 5. *Fort Enterprize.* Richardson.
" 5. *Akur Eyri.* Thienemann.
" 6. *Fort Enterprize.* Richardson.
" 7. *Fort Enterprize.* Richardson.
" 8. *Fort Enterprize.* Richardson.
" 9. *Fort Enterprize.* Richardson.

[1] The corruscations of the aurora were very brilliant at Fort Chippewyan, Lat. 59° N. Long. 111° W., almost every evening of the first week of April. Franklin, I. 143.

[2] Journ. of a Voyage, &c. p. 31.

[1] Edin. Phil. Journ. V. 204.

[2] Gilbert. Ann. LXXV. 64.

[3] Von Wrangel remarks, Nov. 20, 1820, of Nijnei Kolymsk, Lat. 69° N. and Long. 161° E: "the beauty of the varied forms of the aurora, seen on the deep azure of the clear *northern sky*, was a source of unwearied enjoyment to us almost every evening." Narrative of an Expedition, &c. p. 83. Force, p. 80.

[4] Parry states that during his passage across the Atlantic, in October, 1820, the aurora occurred almost every night. Journ. of a Voyage, p. 306. Force, p. 7.

[5] Ann. Chem. et Phys. XV. 424.

[6] Researches about Atmosph. Phenom. 219.

Dec. 10. *Fort Enterprize.* Richardson.
" 11. *Fort Enterprize.* Richardson.
" 11. *Akur Eyri.* Thienemann.
" 12. *Fort Enterprize.* Richardson.
" 13. *Fort Enterprize.* Richardson.
" 14. *Fort Enterprize.* Richardson.
" 17. *Fort Enterprize.* Richardson.
" 18. *Fort Enterprize.* Richardson.
" 19. *Fort Enterprise.* Richardson.
" 20. *Fort Enterprize.* Richardson.
" 21. *Fort Enterprize.* Richardson.
" 22. *Fort Enterprize.* Richardson.
" 23. *Fort Enterprize.* Richardson.
" 23. *Akur Eyri.* Thienemann.
" 25. *Fort Enterprize.* Richardson.
" 26. *Fort Enterprize.* Richardson.
" 26. *Akur Eyri.* Thienemann.
" 27. *Fort Enterprize.* Richardson.
" 27. *Akur Eyri.* Thienemann.
" 28. *Fort Enterprize.* Richardson.
" 29. *Akur Eyri.* Thienemann.
" 29. *Fort Enterprize.* Richardson.
" 30. *Akur Eyri.* Thienemann.
" 30. *Fort Enterprize.* Richardson.
" 31. *Fort Enterprize.* Richardson.

1821.

Jan. 10. *Fort Enterprize.* Hood.[1]
" 11. *Fort Enterprize.* Hood.
" 12. *Fort Enterprize.* Franklin.
" 14. *Fort Enterprize.* Franklin.
" 16. *Fort Enterprize.* Franklin.
" 20. *Fort Enterprize.* Franklin.
" 21. *Fort Enterprize.* Franklin.
" 22. *Fort Enterprize.* Franklin.
" 23. *Fort Enterprize.* Franklin.
" 24. *Fort Enterprize.* Franklin.
" 25. *Fort Enterprize.* Franklin.
" 27. *Fort Enterprize.* Franklin.
" 28. *Fort Enterprize.* Franklin.
" 29. *Fort Enterprize.* Franklin.
" 30. *Fort Enterprize.* Franklin.
" 31. *Fort Enterprize.* Franklin.
Feb. 1. *Fort Enterprize.* Franklin.
" 2. *Fort Enterprize.* Franklin.

[1] Hood states that the number of auroras visible at Fort Enterprize, inLat. 64° N. and Long. 113° W., were, in August, 1820, ten; in September, six; in October, seven; in November, eight; in December, twenty; in January, 1821, seventeen; in February, twenty-two; in March, twenty-five; in April, eighteen; and in May, nine. Franklin, I. 580.

Feb. 3. *Fort Enterprize.* Franklin.
" 4. *Fort Enterprize.* Franklin.
" 5. *Fort Enterprize.* Franklin.
" 6. *Fort Enterprize.* Franklin.
" 7. *Fort Enterprize.* Franklin.
" 8. *Fort Enterprize.* Franklin.
" 9. *Fort Enterprize.* Franklin.
" 10. *Fort Enterprize.* Franklin.
" 11. *Fort Enterprize.* Franklin.
" 12. *Fort Enterprize.* Franklin.
" 13. *Fort Enterprize.* Franklin.
" 14. *Fort Enterprize.* Franklin.
" 15. *Fort Enterprize.* Franklin.
" 18. *Fort Enterprize.* Franklin.
" 19. *Fort Enterprize.* Franklin.
" 20. *Fort Enterprize.* Franklin.
" 22. *Fort Enterprize.* Franklin.
" 23. *Fort Enterprize.* Franklin.
" 24. *Fort Enterprize.* Franklin.
" 26. *Fort Enterprize.* Franklin.
" 27. *Fort Enterprize.* Franklin.
Mar. 1. *Fort Enterprize.* Franklin.
" 1. *Ice. Lt.* 69°*N. Lg.* 168° *E.* Von Wrangel.[1]
" 1. *Nijnei Kolymsk.*[2] Cochrane.
" 2. *Ice.* Von Wrangel. Force.
" 3. *Fort Enterprize.* Franklin.
" 4. *Fort Enterprize.* Franklin.
" 5. *Fort Enterprize.* Franklin.
" 8. *Fort Enterprize.* Franklin.
" 9. *Fort Enterprize.* Franklin.
" 11. *Fort Enterprize.* Franklin.
" 12. *Fort Enterprize.* Franklin.
" 13. *Fort Enterprize.* Franklin.
" 14. *Fort Enterprize.* Franklin.
" 15. *Fort Enterprize.* Franklin.
" 16. *Fort Enterprize.* Franklin.
" 19. *Fort Enterprize.* Franklin.
" 20. *Fort Enterprize.* Franklin.
" 21. *Fort Enterprize.* Franklin.
" 22. *Fort Enterprize.* Franklin.
" 23. *Fort Enterprize.* Franklin.
" 24. *Fort Enterprize.* Franklin.
" 25. *Fort Enterprize.* Franklin.
" 25. *Gosport.*[3] Burney.
" 26. *Fort Enterprize.* Franklin.
" 28. *Fort Enterprize.* Franklin.
" 29. *Fort Enterprize.* Franklin.

[1] Narrative of an Expedition, &c. Force, p. 101.
[2] Narrative of a Pedestrian Journey, &c.
[3] Phil. Mag. and Annals, I. 317.

Mar. 30.	*Fort Enterprize.*	Franklin.
Apr. 1.	*Fort Enterprize.*	Franklin.
" 5.	*Fort Enterprize.*	Franklin.
" 6.	*Fort Enterprize.*	Franklin.
" 7.	*Fort Enterprizr.*	Franklin.
" 8.	*Fort Enterprize.*	Franklin.
" 11.	*Fort Enterprize.*	Franklin.
" 14.	*Fort Enterprize.*	Franklin.
" 15.	*Fort Enterprize.*	Franklin.
" 18.	*Fort Enterprize.*	Franklin.
" 19.	*Fort Enterprize.*	Franklin.
" 20.	*Fort Enterprize.*	Franklin.
" 21.	*Fort Enterprize.*	Franklin.
" 23.	*Fort Enterprize.*	Franklin.
" 27.	*Fort Enterprize.*	Franklin.
" 29.	*Fort Enterprize.*	Franklin.
" 30.	*Fort Enterprize.*	Franklin.
May 1.	*Fort Enterprize.*	Franklin.
" 3.	*Fort Enterprize.*	Franklin.
" 5.	*Fort Enterprize.*	Franklin.
" 6.	*Fort Enterprize.*	Franklin.
" 10.	*Fort Enterprize.*	Franklin.
" 11.	*Fort Enterprize.*	Franklin.
" 12?	*Fort Enterprize.*	Franklin.
" 13.	*Fort Enterprize.*	Franklin.
Aug. 15.	*Southampton Island.*	Parry.[1] Arago.
" 23.	*Belleville, Invernesshire.*	Brewster.[2]
" 29.	*Duckett's Cove.*	Parry.
Nov. 15.	*Winter Island.*	Parry.
" 17.	*Winter Island.*	Parry.
" 23.	*Winter Island.*	Parry.
" 26.	*G. Britain or Ireland.*	Dalton.
" 26.	*Winter Island.*	Parry.[3]
" 27.	*Winter Island.*	Parry.
" 28.	*Winter Island.*	Parry.
Dec. 1.	*Winter Island.*	Parry.
" 2.	*Winter Island.*	Parry.
" 3.	*Winter Island.*	Parry.
" 4.	*Winter Island.*	Parry.
" 12.	*G. Britain or Ireland.*	Dalton.
" 14.	*Winter Island.*	Parry.
" 20.	*Winter Island.*	Parry.
" 22.	*Winter Island.*	Parry.
" 23.	*Winter Island.*	Parry.
" 24.	*Winter Island.*	Parry.
" 27.	*Winter Island.*	Parry.
" 28.	*Winter Island.*	Parry.

[1] Journ. of a Second Voyage, &c. p. 39.

[2] Edin. Phil. Journ. VI. 175. Gilbert. Ann. LXXV. 68.

[3] Journ. of a Second Voyage, Appendix. p. 266.

Dec. 29.	*Winter Island.*	Lyon. Arago.
" 31.	*Winter Island.*	Parry.

1822.[1]

Jan. 9.	*Winter Island.*	Parry.
" 12.	*Winter Island.*	Parry.
" 13.	*Winter Island.*	Parry.
" 15.	*Winter Island.*	Parry.
" 18.	*Winter Island.*	Parry.
Feb. 13.	*From Ferres to Nairn, Scotl.*	Mackenzie.[2]
" 13.	Muncke, Arago, and Quetelet.	
" 19.	*Winter Island.*	Parry.
Apr. 15.	*Lat.* 64° *N. Long.* 6° *W.*	Scoresby. Arago.
" 16.	*Winter Island.*	Parry.
" 17.	*Lat.* 66° *N. Long.* 4° *W.*	Scoresby.
July 13.	*Paris?*	Arago.
Oct. 22.	*Boston.*	Hale. Lovering.
Nov. 7.	*Igloolik.*	Parry.[3]
" 15.	*Igloolik.*	Parry.
" 16.	*Igloolik.*	Parry.
" 21.	*Igloolik.*	Parry.
Dec. 13.	*Igloolik.*	Parry.[4]

1823.

Jan. 19.	*Igloolik.*	Parry.
Feb. 5.	*Igloolik.*	Parry.[5]
Mar. 21.	*Ice. Lat.* 70° *N. Long.* 174° *E.*	Von Wrangel.
Apr. 8.	*Igloolik.*	Parry.
Aug. 31.	*Hudson's Bay.*	Lyon.

1824.

Jan. 21.	*Leith.*	Coldstream. Arago.
July 29.	*Hudson's Bay.*	Lyon.[6] Arago.

[1] In 1822, the aurora was frequently observed by Franklin, at Moose-Deer Island, Lat. 61° N. and Long. 114° W., but it was not brilliant. Franklin. Narrative of a Journey, &c. p. 553.

[2] Edin. Journ. Sci. VI. 380.

[3] Journ. of a Second Voyage, &c. p. 381.

[4] Parry says: "Another peculiarity, observed in this winter, was the rare occurrence of the Aurora Borealis, and the *extraordinary poorness* of its display, whenever it did make its appearance." pp. 381 and 420. Von Wrangel also states, that auroras were rare and less brilliant than usual during the winter of 1822–23, in Lat. 70° N. and Long. 174° E. p. 318. Force, p. 87.

[5] During the dark season, I mean the time that we did not at all see the sun, it was remarked with astonishment that the aurora was very rarely seen, in fact only once or twice, and then so faintly as scarcely to call our attention. Igloolik. Lat. 69° N. Long. 82° W. March, 1823. Lyon's Private Journal, p. 306. Force, p 83.

[6] Private Journal, &c.

Aug. 10. *St. Petersburg.* Wisniewsky. Kupffer.[1]
" 11. *Hudson's Bay.* Lyon.[2] Arago.
Sept. 5. *Hudson's Bay.* Lyon.
" 9. *Edinburgh.* Brewster.[3]
" 9. *Rowe's Welcome.* Lyon. Arago.
" 29. *Hudson's Bay.* Lyon. Arago.
" 29. *St. Petersburg.* Wisniewsky. Kupffer.
Nov. 16. *Konigsburg.* Sommer.[4]
" 17. *Port Bowen.* Parry. Arago.
" 25. *Port Bowen.* Parry. Arago.
" 26. *Port Bowen.* Parry. Arago.
" 27. *Port Bowen.* Parry. Arago.
Dec. 1. *Port Bowen.* Parry. Arago.
" 16. *Port Bowen.* Parry. Arago.
" 20. *Port Bowen.* Parry. Arago.
" 21. *Port Bowen.* Parry.[5] Arago.
" 22. *Port Bowen.* Parry. Arago.
" 23. *Port Bowen.* Parry. Arago.
" 24. *Port Bowen.* Parry. Arago.
" 26. *Port Bowen.* Parry. Fisher.[6]

1825.

Jan. 7. *Port Bowen.* Parry.[7] Arago.
" 11. *Port Bowen.* Parry. Arago.
" 12. *Port Bowen.* Parry. Arago.
" 15. *Port Bowen.* Parry. Arago.
" 16. *Port Bowen.* Parry. Arago.
" 17. *Port Bowen.* Parry. Arago.
" 18. *Port Bowen.* Parry. Arago.
" 20. *Port Bowen.* Parry. Arago.
" 27. *Port Bowen.* Parry. Arago.
" 28. *Port Bowen.* Parry. Arago.
Feb. 11. *Port Bowen.* Parry. Arago.
" 14. *Port Bowen.* Parry.[8] Arago.
" 15. *Port Bowen.* Parry. Arago.
" 16. *Port Bowen.* Parry. Arago.
" 17. *Port Bowen.* Parry. Arago.

[1] Mém. de l'Acad. St. Petersb. IV.

[2] Off Winter Island, Lat. 66° N. Long. 83° W. Aug. 31, 1823. It was remarkable that we should have seen the aurora so seldom and faintly at Igloolik, and that now again we should, on returning to Winter Island, find it as brilliant as we had been accustomed to see it at the same place two years before. Lyon's Private Journal, p. 455.

[3] Edin. Journ. Sci. 1825, p. 55.

[4] Kastn. Archiv. V. 373.

[5] Journal of a Third Voyage, &c. p. 60.

[6] Phil. Trans. 1826. Pt. IV. p. 215.

[7] *Fifteen* auroras were observed at Port Bowen in January; *thirteen* in February; and *five* in March.

[8] Phil. Trans. 1826. Pt. IV. p. 133.

Feb. 19. *Leith.* Coldstream. Quetelet.[1]
" 22. *Port Bowen.* Parry. Arago.
" 23. *Port Bowen.* Parry. Arago.
" 24. *Port Bowen.* Parry. Arago.
Mar. 9. *Port Bowen.* Parry. Arago.
" 12. *Port Bowen.* Parry. Arago.
" 13. *Port Bowen.* Parry. Arago.
" 14. *Port Bowen.* Parry. Arago.
" 19. *G. Britain or Ireland.* Dalton. Arago.
" 19. *Leith.* Coldstream, &c.[2] Muncke. Quetelet.
" 19. *Edinburgh.* Brewster.[3]
Apr. 14. *Boston.* Hale. Lovering.
" 25. *Christiania.* Hansteen. *Hardanger.* Herzberg[4]
Aug. 10. *Christiania.* Halmboe.
" 17. *Leith.* Coldstream.[5]
" 17. Muncke, Arago, and Quetelet.
" 21. *Christiania.* Hansteen.
" 22. *Christiania.* Hansteen.
" 25. *Christiania.* Muncke. Quetelet.
" 26. *Christiania.* Hansteen. Arago.
Sept. 10. *Christiania.* Hansteen.
" 10. *Leith.* Muncke, Arago, Quetelet, and Boué.
" 11. *St. Petersburg.* Wisniewsky. Kupffer.
" 11. *Leith.* Coldstream.
" 15. *Davis's Strait.* Parry. Arago.
" 20. *Davis's Strait.* Parry. Arago.
" 24. *At sea. Lat.* 58° *N. Long.* 44° *W.* Parry. Arago.
Oct. 5. *At sea.* Parry.[6] Arago.
" 7. *Paris.* Arago. Muncke and Quetelet.[7]
" 26. *Fort Franklin.* Franklin.[8]
" 27. *Fort Franklin.* Franklin.
Nov. 2. *Fort Franklin.* Franklin.
" 3. *Norway.* Hansteen. Muncke.
" 3. *Leith.* Coldstream.
" 3. Arago, Muncke, and Quetelet.
" 4. *Norway.* Muncke, Arago, and Quetelet.
" 4. *Leith.* Muncke. *Bergen.* Bohr.[9]
" 22. *Leith.* Coldstream. *Alford.* Farquharson.[10]
" 22. Arago, Muncke, and Quetelet.

[1] Ferussac. Bull. Univ. XI. 202.

[2] Edin. Journ. Sci. V. 190.

[3] Edin. Journ. Sci. III. 181.

[4] Annals of Phil. II. 335.

[5] Edin. Journ. Sci. IX. 86.

[6] Parry says: "In running down Davis's Strait, as well as in crossing the Atlantic, we saw on this passage as well as in all former autumnal ones, a good deal of the Aurora Borealis."

[7] Ann. Chem. et Phys. XXX. 424.

[8] Narrative of a Second Expedition. p. 66.

[9] Annals of Phil. II. 335.

[10] Phil. Trans. 1829, p. 103.

Nov. 23. *Aberdeenshire.* Farquharson. Arago.[1]
Dec. 7. *Boston.* Hale. Lovering.
" 7. *Fort Franklin.* Franklin.
" 8. *Fort Franklin.* Franklin.

1826.

Jan. 4. *Fort Franklin.* Franklin.
" 5. *Königsberg.* Muncke.[2]
" 5. *Leith.* Coldstream, &c. Arago. Quetelet.[3]
" 8. *Fort Franklin.* Franklin.
" 16. *Leith.* Coldstream and Foggo.[4]
" 16. Muncke, Arago, and Quetelet.
" 17. *Leith.* Hough.
" 21. *G. Britain or Ireland.* Dalton. Quetelet.
" 21. *Edinburgh.* Coldstream.[5] Quetelet.
" 29. *Fort Franklin.* Franklin.
Feb. 3. *Fort Franklin.* Franklin.
" 8. *Fort Franklin.* Franklin.
" 9. *Fort Franklin.* Franklin.
" 10. *Fort Franklin.* Franklin.
" 11. *Fort Franklin.* Franklin.
" 11. *Leith.* Coldstream and Foggo. Arago.
" 19. *Fort Franklin.* Franklin.
Mar. 2. *Fort Franklin.* Franklin.
" 7. *Fort Franklin.* Franklin.
" 8. *Fort Franklin.* Franklin.
" 9. *Fort Franklin.* Franklin.
" 10. *Fort Franklin.* Franklin.
" 11. *Fort Franklin.* Franklin.
" 13. *Fort Franklin.* Franklin.
" 14. *Fort Franklin.* Franklin.
" 15. *Fort Franklin.* Franklin.
" 26. *Fort Franklin.* Franklin.
" 28. *Fort Franklin.* Franklin.
" 29. *G. Britain or Ireland. Manchester.* Dalton.
" 29. *Edinburgh.*[6] Coldstream. *Dublin.*
" 29. *Fort Franklin.* Franklin.
" 29. Muncke, Arago, and Quetelet.
Apr. 3. *Fort Franklin.* Franklin.
" 6. *Fort Franklin.* Franklin.
" 13. *Fort Franklin.* Franklin.
" 23. *Fort Franklin.* Franklin.
Apr. 29. *Carlisle and Roxburghshire.* Muncke.[1]
" 29. Arago and Quetelet.
Aug. 25. *Behring's Sea.* Beechey.
" 29. ——— Quetelet and Boué.
Sept. 9. *Canonmills.* Quetelet.[2]
" 10. *Near Edinburgh.*[3]
" 22. *Behring's Sea.* Beechey.[4] Force.
" 25. *Behring's Sea.* Beechey. Force.
Oct. 1. *New York State.* Hough.[5]
" 2. *New York.* Hough.
" 2. *Fort Franklin.* Franklin.
" 13. *Fort Franklin.* Franklin.
" 19. *Fort Franklin.* Franklin.
" 30. *Fort Franklin.* Franklin.
Nov. 1. *Fort Franklin.* Franklin.
" 4. *Fort Franklin.* Franklin.
" 10. *Fort Franklin.* Franklin.
" 16. *Fort Franklin.* Franklin.
" 19. *Fort Franklin.* Franklin.
" 20. *Fort Franklin.* Franklin.
" 22. *Fort Franklin.* Franklin.
" 24. *Fort Franklin.* Franklin.
Dec. 4. *Fort Franklin.* Franklin.
" 19. *Fort Franklin.* Franklin.
" 22. *Fort Franklin.* Franklin.
" 26. *Fort Franklin.* Franklin.

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Jan. 3. *Fort Franklin.* Franklin.
" 9. *Kendal.* Marshall.[6]
" 9. Muncke, Arago, and Quetelet.
" 16. *G. Britain or Ireland.* Dalton.
" 16. *Edinburgh.* Blackadder. Muncke. Quetelet.
" 18. *New Haven.* Herrick. Loomis.
" 18. *G. Britain or Ireland.* Dalton. Arago.
" 18. *Gosport.* Burney. Muncke and Quetelet.
" 19. *New York.* Hough.
" 21. *Edinburgh.* Hough.
" 30. ——— Arago.
" 31. *Fort Franklin.* Franklin.

[1] Phil. Trans. 1829, p. 106.
[2] Gilbert. Ann. LXXXVI. 560.
[3] Edin. Journ. Sci. V. 190.
[4] Edin. Journ. Sci. V. 190.
[5] Edin. Journ. Sci. IX. 129.
[6] Phil. Mag. IV. 419, and V. 154. Edin. Journ. Sci. V. 190. Phil. Trans. 1838, Pt. I. p. 293.

[1] Quart. Journ. Sci. 1827, p. 229. Ann. Chem. et Phys. XXXIII. 421.
[2] Ferussac. Bull. Univ. XI. 33.
[3] Edin. Journ. Sci. IX. 129.
[4] Narrative of a Voyage, &c. I. p. 329.
[5] All the auroras of Hough are to be understood as for the *State* of New York, unless otherwise specified. See "Results of a series of Meter. Observ. &c. in the State of New York, &c., compiled by Franklin B. Hough."
[6] Edin. Journ. Sci. VI. 377.
[7] Edin. New Phil. Journ. III. 342.

Feb. 3. *Fort Franklin.* Franklin.
" 4. *Fort Franklin.* Franklin.
" 6. *Fort Franklin.* Franklin.
" 7. *Fort Franklin.* Franklin.
" 13. *Gosport.* Burney.[1]
" 17. *G. Britain or Ireland.* Dalton.[2]
" 17. *St. Petersburg.* Wisniewsky. Kupffer.
" 17. Arago, Muncke, and Quetelet.
" 23. *Fort Franklin.* Franklin.
" 25. *Fort Franklin.* Franklin.
Mar. 9. ——— Baumhauer.
" 29. *Edinburgh.* Hough.
Apr. 6. *New York.* Hough.
" 16. *New York.* Hough.
Aug. 25. *Behring's Sea.* Beechey. Force.
" 25. *Paris.* Boué[3] and Hough.
" 26. *Copenhagen.* Dau. Boué.
" 27. *New York.* Hough.
" 27. *New Haven.* Herrick. Loomis.
" 27. *Perth, Scotland.* Muncke.[4]
" 27. Arago and Quetelet.
" 28. *New York.* Gale and Hough.[5]
" 28. *New Haven.* Loomis.[6]
" 28. *Wilmington, Delaware.* Gibbon.[7]
" 28. *Schenectady, N. Y.* Joslin. *Canada.*[8]
" 28. *Roxburghshire, Scotland.* Muncke.[9]
" 28. Arago and Quetelet.
" 29. *New York.* Gale and Hough.
" 29. *Schenectady, N. Y.* Joslin.
" 29. *G. Britain or Ireland.* Dalton.
" 29. *Milnegraden.* Arago, Muncke, and Quetelet.[10]
" 30. *New York.* Gale.
" 31. *New York.* Hough. Arago.
Sept. 8. *Boston.* Hale. Lovering.
" 8. *New York.* Hough.
" 8. *New Haven.* Herrick. Loomis.
" 8. *Wilmington.* Gibbon.
" 8. *Augusta, Maine.* Bowdoin.[11]
" 8. *Berlin.* Humboldt. *Finland, Sweden, &c.*[12]

1 Phil. Mag. and Annals. I. 239 and 317.
2 Phil. Mag. and Annals. I.
3 Not in Arago's Catalogue, though Boué quotes him.
4 Edin. Journ. Sci. VII. 377. Ferussac. Bull. Univ. XII. 70.
5 Amer. Journ. Sci. XV.
6 Amer. Journ. Sci. XIV. 91.
7 Amer. Journ. Sci. XXXIII. 299.
8 Amer. Journ. Sci. XIV. and Reports of Regents, &c. 1836, p. 196.
Edin. Journ. Sci. VII. 77. Ferussac. Bull. Univ. XII. 70.
9 Edin. New Journ. Sci. III. 379.
10 Amer. Journ. Sci. XVIII. 72.
11 Pogg. Ann. X. 511. Ferussac. Bull. Univ. IX. 191.

Sept. 8. *Denmark.* Arago, Muncke, and Quetelet.
" 9. *New Haven.* Herrick. Loomis.
" 9. *New York.* Hough. *Schenectady.* Joslin.
" 9. *Canandaigua, N. Y.* Hayes.[1]
" 9. *Wilmington.* Gibbon.
" 9. *G. Britain or Ireland.* Dalton. Arago.
" 9. *Canonmills and Roslin.* Muncke.[2]
" 9. *Alford.* Farquharson. Quetelet.[3]
" 25. *Boston.* Hale. Lovering.
" 25. *New York.* Hough. *Wilmington.* Gibbon.
" 25. *New Haven.* Herrick. Loomis.
" 25. *G. Britain or Ireland.* Dalton.[4]
" 25. *London.* Kendall.[5] *Gosport.* Burney.
" 25. *Paris and Havre.* Arago. Quetelet.
" 25. *St. Petersburg.* Wisniewsky. Kupffer.
" 25. *Fussen (Insel), Sweden, &c.* Muncke.[6]
" 25. *Copenhagen.* Dau.[7]
" 26. *Boreham.* Forster. *Gosport.* Burney.[8]
" 26. *Leipsic.* Poggendorf. *Stettin.*[9] Quetelet.
" 26. *Fussen and Kasan.* Kupffer.[10]
" 27. *Fussen.* Quetelet. *Canandaigua, N. Y?* Hayes.[11]
" 28. *Paris. Fussen.* Quetelet.
" 28. *Finmark.* Keilhau. Muncke.[12]
" 28. *Chamisso Island.* Beechey.[13]
Oct. 1. *Finmark.* Keilhau. Quetelet and Muncke.
" 6. *G. Britain or Ireland.* Dalton. *Manchester.*
" 6. *Roxburghshire.* Arago. Muncke. Quetelet.
" 16. *New York.* Hough.
" 16. *Finmark.* Keilhau. Quetelet and Muncke.
" 17. *Gosport.* Burney. Muncke.
" 17. Arago and Quetelet.
" 18. *Finmark.* Keilhau. Muncke.
" 18. *Roxburghshire.* Muncke. Quetelet.[14]
" 19. *Roxburghshire.* Muncke. Quetelet.
" 30. *Finmark.* Keilhau. Quetelet and Muncke.
Nov. 9. *New York.* Hough.

1 Amer. Journ. Sci. XIV.
2 Quart. Journ. Sci. 1827, p. 489. Edin. New Journ. Sci. III. 378, and XVII. 138.
3 Phil. Trans. 1829, p. 103.
4 Annals of Phil. II. 395.
5 Quart. Journ. Sci. 1827, p. 385.
6 Kastn. Archiv. XIV.
7 Ferussac. Bull. Univ. XI. 295.
8 Phil. Mag. III. 75.
9 Ferussac. Bib. Univ. IX. 191. Pogg. Ann. X. 512.
10 Kastn. Archiv. XIII. 166.
11 Amer. Journ. Sci. XIV.
12 Pogg. Ann. XIV. 621.
13 A Narrative of a Voyage, p. 560.
14 Ferussac. Bull. Univ. XII. 70. Edin. Jour. Sci. XV. 171.

Nov. 9. *New Haven.* Herrick. Loomis.
" 9. *Wilmington.* Gibbon.
" 11. *Finmark.* Keilhau. Quetelet and Muncke.
" 13. *Finmark.* Keilhau. Quetelet and Muncke.
" 18. *Wilmington.* Gibbon. *Gosport.* Burney.
" 18. *G. Britain or Ireland.* Dalton.
" 18. *Roxburghshire.* Arago and Quetelet.[1]
" 19. *G. Britain or Ireland.* Dalton.
" 19. *Finmark.* Keilhau. *Roxburghshire.* Muncke.
" 19. Arago and Quetelet.
" 22. *Finmark.* Keilhau. Quetelet and Muncke.
Dec. 1. *Finmark.* Keilhau. Quetelet and Muncke.
" 7. *Finmark.* Keilhau. Quetelet and Muncke.
" 8. *Denmark.* Dalton.
" 9. *Finmark.* Keilhau. Quetelet and Muncke.
" 10. *Finmark.* Keilhau. Quetelet and Muncke.
" 13. *Finmark.* Keilhau. Quetelet and Muncke.
" 17. *New York.* Hough.
" 21. *Finmark.* Keilhau. Quetelet and Muncke.
" 24. *Finmark.* Keilhau. Quetelet and Muncke.
" 27. *Kendal.* Marshall. Muncke. Quetelet.[2]
" 27. *Crumpsall.* Blackwall.[3]
" 29. *Finmark.* Keilhau. Quetelet and Muncke.
" 31. *Finmark.* Keilhau. Quetelet and Muncke.

1828.

Jan. 1. *Finmark.* Keilhau. Quetelet and Muncke.
" 3. *Finmark.* Keilhau. Quetelet and Muncke.
" 4. *Finmark.* Keilhau. Quetelet and Muncke.
" 16. *New Haven.* Olmsted. Loomis.
" 18. *New York.* Hough.
" 18. *Wilmington.* Gibbon. Arago.
" 19. *New York.* Hough. Arago.
" 19. *New Haven.* Herrick. Loomis.
" 20. *New York.* Hough. Arago.
Feb. 3. *New York.* Hough. Arago.
" 12. *New Haven.* Herrick. Loomis.
" 17. *New York.* Hough.
" 19. ——— Arago.
Apr. 11. *New York.* Hough. Arago.
" 12. *New York.* Hough. Arago.
June 2. *G. Britain or Ireland.* Dalton.
" 5. ——— Quetelet.
July 5. *New York.* Hough.
" 5. *Mont Morillon.* Arago. Muncke.[4]

[1] Edin. Journ. Sci. VIII. 171.
[2] Edin. Journ. Sci. IX. 102. Phil. Trans. 1828, p. 301.
[3] Mem. Lit. and Phil. Soc. Manchest. V. 82.
[4] Ann. Chem. et Phys. XXXIX. 415.

Aug. 14. *New York.* Hough. Arago.
" 14. *New Haven.* Herrick. Loomis.
" 16. *New York.* Hough. Arago.
Sept. 8. *G. Britain or Ireland.* Dalton.
" 8. *New York.* Hough. Arago.
" 12. *New York.* Hough. Arago.
" 15. *G. Britain or Ireland.* Dalton. Arago.
" 15. *Islay and Edinburgh.* Quetelet and Muncke.[1]
" 25. *Gosport.*[2] Burney.
" 26. *New York.* Hough. Arago.
" 26. *New Haven.* Herrick. Loomis.
" 26. *Wilmington.* Gibbon.
" 27. *New York.* Hough.
" 27. *Wilmington.* Gibbon. Arago.
" 28. *Finmark.* Keilhau.[3]
" 29. *New York.* Hough.
" 29. *G. Britain or Ireland.* Dalton.
" 29. *Cornwall.* Gilbert. *Alford.* Farquharson.[4]
" 29. *Netherlands.* Arago, Quetelet, and Muncke.[5]
" 29. *Near Stevenage.* Kater.[6] *Lynn Regis.* Utting.
" 29. *Plymouth.* Harvey.[7] *Gosport.* Burney.
" 30. *New York.* Hough.
" 30. *Plymouth.* Burney. Arago.
Oct. 1. *Finmark.* Keilhau.
" 3. *New York.* Hough. Arago.
" 8. *New York.* Hough. Arago.
" 9. *G. Britain or Ireland.* Dalton.
" 11. *New York.* Hough. Arago.
" 15. *G. Britain or Ireland.* Dalton.
" 15. *Perth, Scotland.* Muncke and Quetelet.[8]
" 16. *Finmark.* Keilhau.
" 18. *Finmark.* Keilhau.
" 19. *Finmark.* Keilhau.
" 26. *Christian's Sound.* Graah.[9] Force.
" 29. *G. Britain or Ireland.* Dalton.
" 29. *Perth.* Muncke, Arago, and Quetelet.
" 30. *Finmark.* Keilhau.
Nov. 8. *New York.* Hough. Arago.
" 11. *Finmark.* Keilhau.
" 11. *Tobolsk.* Erman.[10] Muncke.
" 11. Arago and Quetelet.

[1] Edin. Journ. Sci. X. 177.
[2] Phil. Mag. IV. 392.
[3] Pogg. Ann. XIV. 621.
[4] Phil. Trans. 1829, p. 103, and 1839, p. 267.
[5] Ann. Chem. et Phys. XXXIX. 418. Smyth's Cel. Cyc. I. 166.
[6] Phil. Mag. IV. 337.
[7] Edin. Journ. Sci. X. 146.
[8] Edin. Journ. Sci. X. 179.
[9] Narrative of an Expedition, &c. p. 48.
[10] Pogg. Ann. XXII. 550.

Nov. 13. *Finmark.* Keilhau.
" 19. *Finmark.* Keilhau.
" 22. *Finmark.* Keilhau.
Dec. 1. *New York.* Hough.
" 1. *Sharon, Conn.* Smith. Loomis.
" 1. *St. Petersburg.* Wisniewsky. Kupffer.
" 1. *G. Britain or Ireland.* Dalton.[1]
" 1. *Manchester.* Blackwall. *London.*[2]
" 1. *Finmark.* Keilhau.
" 1. *Russia.* Erman.[3] Muncke.
" 1. Arago and Quetelet.
" 7. *Finmark.* Keilhau.
" 9. *Finmark.* Keilhau.
" 10. *Finmark.* Keilhau.
" 13. *Finmark.* Keilhau.
" 21. *Finmark.* Keilhau.
" 22. *G. Britain or Ireland.* Dalton.
" 24. *Finmark.* Keilhau.
" 26. *G. Britain or Ireland.* Dalton.
" 26. *Manchester.* Blackwall. *Gosport.* Burney.
" 26. Muncke, Arago, and Quetelet.
" 28. *G. Britain or Ireland.* Dalton.
" 28. Arago and Quetelet.
29. *Finmark.* Keilhau.
" 31. *Finmark.* Keilhau.

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Jan. 1. *Finmark.* Keilhau.
" 2. *Kendal.* Marshall. Muncke.
" 2. Arago and Quetelet.
" 3. *Finmark.* Keilhau.
" 4. *Finmark.* Keilhau.
" 27. *New York.* Hough. Arago.
" 28. *Wilmington.* Gibbon.
" 30. *New York.* Hough. Arago.
" 31. *New York.* Hough. Arago.
Feb. 11. *Berlin.* Humboldt. Muncke.
" 11. Arago and Quetelet.
Mar. 4. *G. Britain or Ireland.* Dalton.
" 6. *G. Britain or Ireland.* Dalton.
" 18. *Wilmington.* Gibbon.
" 21. *Christian's Sound.* Graah.
Mar. 22. *G. Britain or Ireland.* Dalton.
" 23. *England.* Maclear. Muncke.
" 23. Arago and Quetelet.
" 27. *Greenland.* Graah.
Apr. 4. *New York.* Hough.
" 4. *Dieppe.* Arago, Muncke, and Quetelet.[1]
" 5. *New York.* Hough. Arago.
" 8. *New York.* Hough. Arago.
" 12. *Greenland.* Graah.
May 2. *Paris.* Arago.
" 4. *G. Britain or Ireland.* Dalton.
" 29. *New York.* Hough. Arago.
" 31. *New York.* Hough. Arago.
June 1. *New York.* Hough. Arago.
" 2. *New York.* Hough. Arago.
" 7. *New York.* Hough. Arago.
" 14. *New York.* Hough. Arago.
" 17. *G. Britain or Ireland.* Dalton.
" 21. *New York.* Hough. Arago.
" 25. *Kendal.* Marshall.
" 25. Muncke and Quetelet.
July 25. *G. Britain or Ireland.* Dalton.
" 25. Arago and Muncke.
Aug. 23. *Greenland.* Graah.
" 25. *New York.* Hough. Arago.
" 26. *New York.* Hough. Arago.
" 29. *Berwickshire, England.* Hough.
Sept. 13. *New York.* Feuchtwanger.[2]
" 18. *New York.* Hough. Arago.
" 19. *G. Britain or Ireland.* Dalton.
" 19. *New York.* Feuchtwanger.
" 19. Muncke, Arago, and Quetelet.
" 21. *G. Britain or Ireland.* Dalton.
" 21. *Alford.* Farquharson.
" 21. Muncke, Arago, and Quetelet.
" 22. *Aberdeenshire.* Muncke.
" 22. Muncke, Arago, and Quetelet.
" 26. *New York.* Hough. Arago.
Oct. 1.[3] *Aberdeenshire.* Farquharson.
" 1. Arago, Muncke, and Quetelet.
" 3. *G. Britain or Ireland.* Dalton.
" 3. Muncke, Arago, and Quetelet.
" 6. *Kendal.* Muncke and Quetelet.
" 11. *G. Britain or Ireland.* Dalton.

[1] Quart. Journ. Sci. 1828, p. 449.
[2] Phil. Mag. V. 77 and 153.
[3] Travels in Siberia, I. 351.
[4] Southern Greenland, Winter of 1828–9. "The northern lights (Aurora Borealis), a remarkable and beautiful phenomenon of which the inhabitants of the greater part of Europe can form no adequate conception, are in Greenland and Iceland a thing of every-day occurrence, &c." Graah's Narrative of an Expedition &c. p. 52. Force's record of Auroral Phenomena, p. 50.

[1] Compt. Rend. XLII. 357.
[2] Amer. Journ. Sci. XVIII. 393.
[3] Graah was at Nukarbik, in Lat. 63° N. and Long. 41° W. from October 1, 1829 to April 5, 1830; but he does not mention a single appearance of the aurora. Force's Record of Auroral Phenomena, p. 54.

Oct. 11. *Aberdeenshire.* Muncke and Quetelet.
" 11. *Alford.* Farquharson.
" 15. *Perth.*[1]
" 17. *G. Britain or Ireland.* Dalton.
" 17. Muncke, Arago, and Quetelet.
" 18. *Felix Harbor.* Ross.[2]
" 21. *New York.* Hough.
" 21. *Felix Harbor.* Ross. Arago.
" 24. *New York.* Hough. Arago.
" 25. *G. Britain or Ireland.* Dalton.
" 25. *Alford.* Farquharson.
" 25. Muncke, Arago, and Quetelet.
" 27. *New York.* Hough. Arago.
" 29. *Perth.*[3]
" 30. ——— Arago?
" 31. *Felix Harbor.* Ross.
Nov. 1. *Felix Harbor.* Ross.
" 9. *New York.* Hough. Arago.
" 17. *G. Britain or Ireland.* Dalton.
" 17. *Alford.* Farquharson.
" 17. Muncke, Arago, and Quetelet.
" 18. *G. Britain or Ireland.* Dalton.
" 18. *Alford.* Farquharson.
" 18. Muncke, Arago, and Quetelet.
" 19. *New York.* Hough.
" 19. *G. Britain or Ireland.* Dalton.
" 19. *Alford.* Farquharson.
" 19. Muncke, Arago, and Quetelet.
" 21. *Felix Harbor.* Ross.
" 24. *Felix Harbor.* Ross.
" 25. *Felix Harbor.* Ross.
Dec. 2. *Felix Harbor.* Ross.
" 9. *Felix Harbor.* Ross.
" 14. *G. Britain or Ireland.* Dalton.
" 14. *Alford.* Farquharson.[4] *Gosport.* Burney.
" 14. Muncke, Arago, and Quetelet.
" 18. *Felix Harbor.* Ross.
" 19. *New York.* Hough. *Wilmington.* Gibbon.
" 19. *New Haven.* Herrick. Loomis.
" 19. *Felix Harbor.* Ross. Arago.
" 19. *Tullynessle.* Paull.
" 19. *Alford.* Farquharson.
" 19. *G. Britain or Ireland.* Dalton. Dove.[5]
" 20. *New Haven.* Herrick. Loomis.
" 20. *G. Britain or Ireland.* Dalton.

[1] Edin. Journ. Sci. X. 117.
[2] Narrative of a Second Voyage, &c. p. 204.
[3] Edin. Journ. X. 117.
[4] Phil. Trans. 1330, p. 99. Phil. Mag. VII.
[5] Pogg. Ann. XX. 333.

Dec. 20. *Felix Harbor.* Ross.
" 20. *Alford.* Farquharson.[1]
" 20. Muncke, Arago, and Quetelet.
" 24. *Felix Harbor.* Ross.
" 25. *Felix Harbor.* Ross.
" 28. *New York.* Hough. Arago.
" 30. *Felix Harbor.* Ross.

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Jan. 6. *Felix Harbor.* Ross.
" 24. *New York.* Hough.
" 25. *G. Britain or Ireland.* Dalton.
" 25. *Alford.* Farquharson.
" 25. Muncke, Arago, and Quetelet.
" 27. *New York.* Hough.
" 28. *G. Britain or Ireland.* Dalton.
" 28. *Alford.* Farquharson.
" 28. Muncke and Quetelet.
Feb. 16. *New York.* Hough.
" 18. *New York.* Hough.
" 19. *New York.* Hough. *Kendal.* Marshall.
" 19. Arago, Muncke, and Quetelet.
" 23. *New York.* Hough.
" 24. *St. Petersburg.* Wisniewsky. Kupffer.[2]
Mar. 15. *New York.* Hough.
" 16. *New York.* Hough.
" 18. *G. Britain or Ireland.* Dalton.
" 18. *St. Petersburg.* Wisniewsky. Kupffer.
" 18. Arago, Muncke, and Quetelet.
" 24. *G. Britain or Ireland.* Dalton. Arago.
" 24. *Alford.* Farquharson.
" 28. *New York.* Hough.
" 31. *New York.* Hough.
Apr. 15. *Sharon.* Smith. Loomis.
" 19. *New York.* Hough.
" 19. *G. Britain or Ireland.* Dalton.
" 19. *Gosport.* Burney. *Bedford.* White.[3]
" 19. Arago, Muncke, and Quetelet.
" 20. *New York.* Hough.
" 21. *New York.* Hough.
" 24. *G. Britain or Ireland.* Dalton. Arago.
" 25. *New York.* Hough.
" 28. *New York.* Hough.
May 2. *New York.* Hough.
" 4. *New York.* Hough.

[1] Phil. Trans. 1830, p. 104.
[2] Mém. de l'Acad. St. Petersb. N. S. II. et IV.
[3] Phil. Mag. VII. 464.

May 5. *St. Petersburg.* Kupffer. Muncke.[1]
" 5. Arago and Quetelet.
" 5. *St. Petersburg.* Kupffer.[2]
" 6. *Wilmington.* Gibbon.
" 9. *New York.* Hough.
" 10. *New York.* Hough.
" 11. *New York.* Hough.
" 13. *New York.* Hough.
" 14. *New York.* Hough. *Wilmington.* Gibbon.
" 15. *New York.* Hough. *Wilmington.* Gibbon.
" 19. *New York.* Hough.
" 22. *New York.* Hough.
June 9. *New York.* Hough.
" 10. *Boston.* Hale. Lovering.
" 10. *Wilmington.* Gibbon.
" 11. *Boston.* Hale. Lovering.
" 11. *New York.* Hough. *Wilmington.* Gibbon.
" 16. *New York.* Hough.
" 17. *New York.* Hough.
" 18. *New York.* Hough.
" 29. *New York.* Hough.
July 7. *New York.* Hough.
" 14. *New York.* Hough. *Wilmington.* Gibbon.
" 14. *Fayetteville, Vermont.* Hough.
" 15. *New York.* Hough.
" 21. *New York.* Hough.
" 28. *New York.* Hough.
Aug. 8. *New York.* Hough.
" 10. *New York.* Hough.
" 11. *New York.* Hough.
" 12. *New York.* Hough.
" 13. *New York.* Hough.
" 15. *Wilmington.* Gibbon.
" 19. *New York.* Hough.
" 20. *Wilmington.* Gibbon. *Gosport.* Burney.[3]
" 20. *G. Britain or Ireland.* Dalton.
" 20. Arago, Muncke, and Quetelet.
" 21. *New York.* Hough.
" 25. *New York.* Hough.
" 26. *New York.* Hough.
" 28. *New York.* Hough.
" 29. *New York.* Hough.
Sept. 5. *New York.* Hough.
" 7. *New York.* Hough.
" 7. *G. Britain or Ireland.* Dalton.
" 7. *Bedford.* White. *Gosport.* Burney.

[1] Mém. de l'Acad. St. Petersb. N. S. I.
[2] Pogg. Ann. XVIII. 611.
[3] Phil. Mag. Second Series, VIII. 316.

Sept. 7. Arago, Muncke, and Quetelet.
" 8. *G. Britain or Ireland.* Dalton. Quetelet.
" 8. *Bedford.* White. *Gosport.* Burney.[1]
" 9. *New York.* Hough.
" 10. *New York.* Hough.
" 10. *G. Britain or Ireland.* Dalton. Arago.
" 11. *New York.* Hough.
" 12. *G. Britain or Ireland.* Dalton. Arago.
" 12. *Wilmington.* Gibbon.
" 13. *G. Britain or Ireland.* Dalton.
" 13. *St. Petersburg.* Kupffer.
" 13. Arago, Muncke, and Quetelet.
" 15. *New York.* Hough. *Wilmington.* Gibbon.
" 16. *New York.* Hough. *Wilmington.* Gibbon.
" 17. *New York.* Hough. *Wilmington.* Gibbon.
" 17. *Bedford.* White. *Gosport.* Burney.
" 17. *G. Britain or Ireland.* Dalton. Muncke.
" 17. *St. Petersburg.* Wisniewsky. Kupffer. Arago.
" 18. *St. Petersburg.* Wisniewsky. Kupffer.
" 19. *G. Britain or Ireland.* Dalton.
" 19. *St. Petersburg.* Wisniewsky. Kupffer. Arago.
" 20. *G. Britain or Ireland.* Dalton. Arago.
" 21. *G. Britain or Ireland.* Dalton. Arago.
" 23. *St. Petersburg.* Kupffer.
" 24. *Scotland.* Arago.
" 25. *G. Britain or Ireland.* Dalton. Arago.
Oct. 5. *New York.* Hough.
" 5. *G. Britain or Ireland.* Dalton.
" 5. Arago, Muncke, and Quetelet.
" 5. *Bedford.* White. *Gosport.* Burney.
" 5. *Kendal.* Hough.
" 6. *New York.* Hough.
" 6. *At Sea. Lat.* 44°. *Long.* 52°. Acosta. Arago.
" 7. *New York.* Hough.
" 8. *New York.* Hough.
" 9. *New York.* Hough. *Wilmington.* Gibbon.
" 9. *Cambridge, England.* Hough.
" 10. *New York.* Hough.
" 11. *New York.* Hough.
" 13. *New York.* Hough.
" 14. *New York.* Hough.
" 15. *New York.* Hough.
" 15. *Shetland Islands.* Hough[2].
" 16. *New York.* Hough.
" 16. *G. Britain or Ireland.* Dalton.
" 16. Arago, Muncke, and Quetelet.

[1] Phil. Mag. IX. 393.
[2] Results of a series of Meter. Observ. &c., in the State of New York, &c., p. 474.

Oct. 16. *Bedford.* White. *Gosport.* Burney.[1]
" 17. *New York.* Hough.
" 17. *G. Britain or Ireland.* Dalton. Arago.
" 17. *Bedford.* White. *Gosport.* Burney. Quetelet.
" 18. *St. Petersburg.* Wisniewsky. Kupffer.
" 22. *G. Britain or Ireland.* Dalton.
" 22. *St. Petersburg.*[2] Wisniewsky. Kupffer.
" 27. *New York.* Hough.
" 28. *New York.* Hough.
Nov. 1. *G. Britain or Ireland.* Dalton.
" 1. Arago, Muncke, and Quetelet.
" 1. *Bedford.* White. *Gosport.* Burney.
" 1. *Boston, England.*
" 3. *G. Britain or Ireland.* Dalton.
" 4. *G. Britain or Ireland.* Dalton.
" 4. *Bedford.* White. *Gosport.* Burney.
" 4. Arago, Muncke, and Quetelet.
" 7. *G. Britain or Ireland.* Dalton.
" 7. *Bedford.* White. *Gosport.* Burney.[3]
" 7. Arago, Muncke, and Quetelet.
" 9. *New York.* Hough.
" 10. *G. Britain or Ireland.* Dalton.
" 14. *Sheriff's Bay.* Ross.
" 19. *New York.* Hough.
" 20. *New Haven.* Olmsted. Loomis.
" 20. *New York.* Hough.
" 21. *New York.* Hough.
Dec. 1.[4]
" 6. *New York.* Hough.
" 7. *New York.* Hough.
" 7. *Christiania.* Hansteen. Muncke.
" 7. *Marburg.* Von Mons. *Warsaw.*[5]
" 7. Arago, Muncke, and Quetelet.
" 8. *St. Petersburg.* Wisniewsky. Kupffer.
" 10. *New York.* Hough.
" 11. *Boston.* Hale. Lovering.
" 11. *Newbery, Vt.* Johnson.[6] *New York.* Hough.
" 11. *Sharon, Conn.* Smith. Loomis.
" 11. *Wilmington.* Gibbon.
" 11. *G. Britain or Ireland.* Dalton. Arago.
" 11. *Bedford.* White. *Gosport.* Burney.
" 11. Arago, Muncke, and Quetelet.
" 12. *New York.* Hough. *Wilmington.* Gibbon.
Dec. 12. *Sharon, Conn.* Smith. Loomis.
" 12. *G. Britain or Ireland.* Dalton.
" 12. *Bedford.* White. *Gosport.* Burney.
" 12. Arago, Muncke, and Quetelet.
" 13. *G. Britain or Ireland.* Dalton.
" 13. *Bedford.* White. *Gosport.* Burney. Quetelet.
" 14. *G. Britain or Ireland.* Dalton.
" 14. *Gosport.* Burney. *Bedford.* White.
" 14. *Warsaw.* Kastner. Quetelet.
" 15. *St. Petersburg.* Wisniewsky. Kupffer.
" 16. *Sheriff's Bay.* Ross.
" 22. *G. Britain or Ireland.* Dalton.
" 25. *G. Britain or Ireland.* Dalton.
" 25. Arago, Muncke, and Quetelet.
" 25. *Gosport.* Burney. *Kendal.* Hough.
" 30. *Kendal.* Hough.

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Jan. 5.[1] *G. Britain or Ireland.* Dalton.
" 6. *New York.* Hough. *Wilmington.* Gibbon.
" 6. *G. Britain or Ireland.* Dalton.
" 6. *Gosport.* Burney.
" 7. *New York.* Hough. *Wilmington.* Gibbon.
" 7. *Bedford.* White. *Gosport.* Burney. *Brussels.*[2]
" 7. *G. Britain or Ireland.* Dalton.[3]
" 7. *Geneva.* Wartman. *Paris.* Arago.[4]
" 7. *Spain.* Eyero. Rico. *Woolwich.* Sturgeon.[5]
" 7. *Utrecht.* Moll. *Krankfurt.* Kastner. Quetelet.[6]
" 8. *G. Britain or Ireland.* Dalton.
" 8 *Gosport.* Burney. Quetelet.
" 8. *Woolwich.* Sturgeon. *Bedford.* White.
" 10. *G. Britain or Ireland.* Dalton.
" 10. *Gosport.* Burney.
" 11. *G. Britain or Ireland.* Dalton. Quetelet.
" 11. *Gosport.* Burney. *Bedford.* White.
" 14. *New York.* Hough.
" 14. *At Sea.* Quetelet.[7]
" 15. *At Sea.* Quetelet.
" 16. *At Sea.* Quetelet.
" 21. *G. Britain or Ireland.* Dalton.
Feb. 6. *New York.* Hough. *Wilmington.* Gibbon.

[1] Phil. Mag. VIII. 465.
[2] The observations at St. Petersburgh from 1824 to 1834 were made by Wisniewsky and published by Kupffer.
[3] Phil. Mag. IX. 79.
[4] Kastn. Archiv. XX. 376.
[5] Kastn. Archiv. XX. 375–6.
[6] Reports of Regents of New York, &c.

[1] Ross remarks that he had scarcely noticed an aurora during the whole winter. Force's Record, &c. p. 86.
[2] Ferussac. Bull. Univ. XVI. 148.
[3] Phil. Mag. IX. 233.
[4] Bib. Univ. XLVI.
[5] Phil. Mag. IX. 127.
[6] Ferussac. Bull. Univ. XVI. 89. Schweigg. Jahr. LXI. and Kastn. Archiv. XXI.
[7] Compt. Rend. II. 329.

Feb. 6. *Sharon.* Smith. Loomis.
" 7. *New York.* Hough.
" 7. *Sheriff's Harbor.* Ross.
" 8. *Sheriff's Harbor.* Ross.
" 11. *G. Britain or Ireland.* Dalton.
" 14. *New York.* Hough.
" 14. *G. Britain or Ireland.* Dalton.
" 17. *G. Britain or Ireland.* Dalton.
Mar. 1. *New York.* Hough.
" 1. *Sheriff's Harbor.* Ross.
" 2. *New York.* Hough.
" 2. *Sheriff's Harbor.* Ross.
" 3. *New York.* Hough.
" 5. *New York.* Hough.
" 6. *New York.* Hough.
" 6. *G. Britain or Ireland.* Dalton.
" 7. *New York.* Hough. *Gosport.* Burney.[1]
" 7. *G. Britain or Ireland.* Dalton.
" 8. *New York.* Hough. *Wilmington.* Gibbon.
" 8. *Gosport.* Burney.
" 8. *G. Britain or Ireland.* Dalton.
" 8. *St. Petersburg.* Wisniewsky. Kupffer.[2]
" 9. *New York.* Hough.
" 9. *Fayetteville, Vermont.* Hough.
" 9. *Buchholz.* Pastorff. Arago.
" 9. *Sheriff's Harbor.* Ross.
" 10. *New York.* Hough.
" 11. *New York.* Hough.
" 11. *G. Britain or Ireland.* Dalton.
" 11. *Gosport.* Burney. *St. Petersburg.* Kupffer.[3]
" 12. *New York.* Hough.
" 12. *G. Britain or Ireland.* Dalton.
" 12. *St. Petersburg.* Wisniewsky. Kupffer.
" 13. *New York.* Hough.
" 15. *G. Britain or Ireland.* Dalton.
" 16. *New York.* Hough.
" 18. *New York.* Hough.
" 20. *New York.* Hough.
" 24. *St. Petersburg.* Wisniewsky. Kupffer.
Apr. 1. *New York.* Hough.
" 2. *New York.* Hough.
" 3. *G. Britain or Ireland.* Dalton.
" 12. *Paris?* Arago.
" 18. *New York.* Hough.
" 19. *New York.* Hough.
" 19. *Sharon, Conn.* Smith. Loomis.

[1] Phil. Mag. IX.
[2] Mém. de l'Acad. St. Petersb. IV.
[3] Mém. de l'Acad. St. Petersb. III.

Apr. 19. *G. Britain or Ireland.* Dalton.
" 19. *Gosport.* Burney. *London. Portsmouth.*
" 19. *St. Petersburg.* Wisniewsky. Kupffer.
" 19. *Berlin.* Kastner. Arago.[1]
" 20. *New York.* Hough. *Wilmington.* Gibbon.
" 20. *G. Britain or Ireland.* Dalton.
" 20. *Gosport.* Burney. *Kitzingen.* Kastner.[2]
" 23. *G. Britain or Ireland.* Dalton.
" 30. *New York.* Hough.
May 7. *New York.* Hough.
" 8. *Wilmington.* Gibbon.
" 15. *New York.* Hough.
" 30. *G. Britain or Ireland.* Dalton.
" 30. *Gosport.* Burney.
June 1. *New York.* Hough.
" 2. *New York.* Hough.
" 10. *New York.* Hough. *Wilmington.* Gibbon.
" 11. *New York.* Hough.
" 16. *New York.* Hough.
" 17. *New York.* Hough.
" 21. *New York.* Hough.
July 1. *New York.* Hough.
" 2. *New York.* Hough.
" 3. *New York.* Hough.
" 4. *New York.* Hough. *Wilmington.* Gibbon.
" 5. *New York.* Hough. *Wilmington.* Gibbon.
" 6. *New York.* Hough.
" 8. *New York.* Hough.
" 9. *New York.* Hough.
" 10. *New York.* Hough. *Wilmington.* Gibbon.
" 12. *New York.* Hough.
" 30. *Gosport.* Burney.
" 31. *New York.* Hough. *Wilmington.* Gibbon.
Aug. 3. *Italy.* Fea. Boué.
" 4. *Italy.* Fea. Boué.
" 5. *Italy.* Fea. Boué.
" 6. *New York.* Hough.
" 19. *Albany, N. Y.* Henry.[3]
Sept. 9. *New York.* Hough.
" 12. *G. Britain or Ireland.* Dalton.
" 12. *Gosport.* White.
" 13. *St. Petersburg.* Wisniewsky. Kupffer.
Oct. 23. *New York.* Hough.
" 24. *New York.* Hough.
" 29. *New York.* Hough. *Wilmington.* Gibbon.

[1] Kastn. Archiv. XXI. 85.
[2] Kastn. Archiv. XXI. 85.
[3] Phil. Mag. X. 78.
[4] Amer. Journ. Sci. XXII. 143 and 155.

Nov. 29. *G. Britain or Ireland.* Dalton.
" 29. *Gosport.* Burney.[1]
Dec. 9. *New York.* Hough. Arago.
" 22. *Paris?* Arago.

1832.

Jan. 8. *Victoria Harbor.* Ross.
" 22. *New York.* Hough. *Wilmington.* Gibbon.
" 27. *G. Britain or Ireland.* Dalton.
Feb. 2. *Giengen.* Binder.[2]
Mar. 26. *New York.* Hough.
" 27. *New York.* Hough. *Wilmington.* Gibbon.
Apr. 10. *New York.* Hough.
" 19. *New York.* Hough.
" 21. *New York.* Hough.
" 24. *New York.* Hough.
" 28. *New York.* Hough.
May 12. *New York.* Hough.
" 29. *New York.* Hough.
" 31. *New York.* Hough.
June 1. *New York.* Hough.
" 2. *New York.* Hough.
" 20. *New York.* Hough.
" 27. *Sharon, Conn.* Smith. Loomis.
Aug. 12. *New York.* Hough.
" 22. *New York.* Hough. *Wilmington.* Gibbon.
" 23. *New York.* Hough. *Wilmington.* Gibbon.
" 23. *Sharon, Conn.* Smith. Loomis.
" 24. *New York.* Hough.
Sept. 1. *New York.* Hough.
" 16. *New York.* Hough.
" 17. *England.* Hough.
" 23. *G. Britain or Ireland.* Dalton.
" 23. *Gosport.* Burney. *Smedley.* Potter.[3]
" 30. *New York.* Hough. *Wilmington.* Gibbon.
Oct. 7. *New York.* Hough.
" 12. *England.* Hough.
" 30. *New York.* Hough.
" 31. *Nova Zembla.* Hough.
Nov. 1. *G. Britain or Ireland.* Dalton.
" 4. *G. Britain or Ireland.* Dalton.
" 13. *St. Petersburg.* Wisniewsky. Kupffer.[4]
" 14. *Wilmington.* Gibbon.
" 15. *New York.* Hough.
" 27. *Providence, R. I.* Caswell.[5]

[1] Phil. Mag. X. 471.
[2] Kastn. Archiv. XXIII. 319.
[3] Phil. Mag. Third Series, II. 233 and 315.
[4] Mém. de l'Acad. St. Petersb. III. Bull. Sci. I. pp. 7–11–14.
[5] Meter. Observ. at Prov. in Smith. Contrib. XII.

Dec. 21. *G. Britain or Ireland.* Dalton.
" 21. *Newcastle-on-Tyne.* Potter.[1] *Gosport.* Burney.

1833.

Jan. 2. *Wilmington.* Gibbon.
" 19. *New York.* Hough.
Feb. 11. *G. Britain or Ireland.* Dalton.
" 18. *G. Britain or Ireland.* Dalton.
" 19. *G. Britain or Ireland.* Dalton.[2]
Mar. 13. *Cambridge, England.* Airy.[3]
" 13. *G. Britain or Ireland.* Dalton.
" 13. *Nova Zembla.* Hough.
" 13. *St. Petersburg.* Wisniewsky. Kupffer.
" 17. *New York.* Hough.
" 21. *Wilmington.* Gibbon. Quetelet.
" 21. *G. Britain or Ireland.* Dalton.
" 21. *Edinburgh.* Forbes. *Ireland.* Robinson,[4] &c.
" 23. *New York.* Hough.
Apr. 23. *New York.* Hough.
" 24. *New York.* Hough.
" 26. *New York.* Hough.
May 7. *New York.* Hough.
" 16. *New York.* Hough.
" 17. *New York.* Hough. *Wilmington.* Gibbon.
" 17. *New Haven.* Loomis.
" 18. *New York.* Hough.
June 14. *New York.* Hough.
" 17. *Wilmington.* Gibbon.
" 29. *New York.* Hough.
July 10. *New York.* Hough. *Wilmington.* Gibbon.
" 10. *New Haven.* Loomis.
" 12. *New York.* Hough.
" 13. *New York.* Hough.
Aug. 1. *New York.* Hough.
" 6. *New York.* Hough.
" 6. *G. Britain or Ireland.* Dalton.
" 15. *New York.* Hough.
" 21. *St. Petersburg.* Wisniewsky. Kupffer.
Sept. 1. *New York.* Hough.
" 1. *G. Britain or Ireland.* Dalton.
" 2. *New York.* Hough.
" 5. *New York.* Hough.
" 6. *New York.* Hough. *Nova Zembla.* Hough.
" 7. *New York.* Hough.

[1] Phil. Mag. II. Third Series, 233.
[2] March, 1833. No Aurora Borealis had been seen; and, indeed, we had scarcely noticed one the whole winter. Ross's Narrative of a Second Voyage, &c. p. 694. Force, p. 90.
[3] Phil. Mag. Third Series, II. 315.
[4] Proc. Brit. Assoc. II. 401.

Sept. 10. *New York.* Hough.
" 12. *G. Britain or Ireland.* Dalton.
" 13. *New York.* Hough.
" 15. *G. Britain or Ireland.* Dalton.
" 17. *Cambridge.* Airy. *York.* Phillips, &c.[1]
" 17. *G. Britain or Ireland.* Dalton.
" 17. *Brussels.* Quetelet.[2]
" 17. *St. Petersburg.* Wisniewsky. Kupffer.
" 18. *G. Britain or Ireland.* Dalton.
" 22. *New York.* Hough.
" 23. *New York.* Hough.
" 25. *New York.* Hough.
Oct. 4. *New York.* Hough.
" 5. *New York.* Hough.
" 12. *Cambridge.* Airy. *Armagh.* Robinson, &c.[3]
" 12. *G. Britain or Ireland.* Dalton. Quetelet.
" 12. *St. Petersburg.* Wisniewsky. Kupffer.
" 13. *New York.* Hough. *Wilmington.* Gibbon.
" 14. *New York.* Hough.
" 16. *New York.* Hough.
" 27. *Great Slave Lake.* Hough.
" 28. *Great Slave Lake.* Hough.
Nov. 2. *Fort Reliance.* Back and King.[4]
" 3. *New York.* Hough. *Fort Reliance.* Back.
" 6. *Fort Reliance.* Back and King.
" 7. *Fort Reliance.* Back and King.
" 8. *Fort Reliance.* Back and King.
" 10. *Fort Reliance.* Back and King.
" 11. *Fort Reliance.* Back and King.
" 12. *Fort Reliance.* Back and King.
" 12. *Brussels.* Quetelet.
" 13. *New Haven.* Loomis.[5]
" 13. *Fort Reliance.* Back and King.
" 14. *Fort Reliance.* Back and King.
" 18. *Fort Reliance.* Back and King.
" 19 *Fort Reliance.* Back and King.
" 20. *Fort Reliance.* Back and King.
" 21. *Fort Reliance.* Back and King.
" 23. *Fort Reliance.* Back and King.
" *x.* *Cuba.* Poey.[6]
Dec. 3. *Fort Reliance.* Back and King.
" 6. *Fort Reliance.* Back and King.
" 7. *Fort Reliance.* Back and King.

[1] Proc. Brit. Assoc. II. 486. Chart. Edin. New Phil. Journ. XVI. 36.
[2] Annal. de l'Observ. XI. 42.
[3] Proc. Brit. Assoc. II. 486.
[4] Narrative of the Arctic Land Expedition, and Hough's Cat.
[5] Amer. Journ. Sci. XXV. 384.
[6] Amer. Journ. Sci. N. S. XXVIII. 404.

Dec. 10. *Fort Reliance.* Back and King.
" 11. *Fort Reliance.* Back and King.
" 12. *Fort Reliance.* Back and King.
" 15. *Wilmington.* Gibbon.
" 15. *Fort Reliance.* Back and King.
" 16. *Fort Reliance.* Back and King.
" 17. *Fort Reliance.* Back and King.
" 19. *Fort Reliance.* Back and King.
" 20. *Fort Reliance.* Back and King.
" 22. *Fort Reliance.* Back and King.
" 25. *Fort Reliance.* Back and King.
" 29. *New York.* Hough.
" 29. *Fort Reliance.* Back and King.
" 29. *Alford.* Farquharson.[1]
" 30. *New York.* Hough.
" 30. *Fort Reliance.* Back and King.
" 31. *Fort Reliance.* Back and King.

1834.

Jan. 1. *Fort Reliance.* Back and King.
" 2. *Fort Reliance.* Back and King.
" 3. *Fort Reliance.* Back and King.
" 4. *Fort Reliance.* Back and King.
" 5. *G. Britain or Ireland.* Dalton.
" 5. *Fort Reliance.* Back and King.
" 6. *Fort Reliance.* Back and King.
" 7. *New York.* Hough.
" 7. *Fort Reliance.* Back and King.
" 8. *Fort Reliance.* Back and King.
" 9. *Fort Reliance.* Back and King.
" 10. *New York.* Hough.
" 10. *Fort Reliance.* Back and King.
" 11. *Fort Reliance.* Back and King.
" 12. *Fort Reliance.* Back and King.
" 13. *Fort Reliance.* Back and King.
" 14. *Fort Reliance.* Back and King.
" 15. *Fort Reliance.* Back and King.
" 15. *Brussels.* Quetelet.
" 16. *Fort Reliance.* Back and King.
" 17. *Fort Reliance.* Back and King.
" 18. *Fort Reliance.* Back and King.
" 19. *Fort Reliance.* Back and King.
" 20. *Fort Reliance.* Back and King.
" 21. *Fort Reliance.* Back and King.
" 22. *Fort Reliance.* Back and King.
" 23. *Fort Reliance.* Back and King.
" 27. *Fort Reliance.* Back and King.
" 28. *New York.* Hough.

[1] Phil. Trans. 1839, p. 267.

Jan. 28. *Fort Reliance.* Back and King.
" 29. *Fort Reliance.* Back and King.
" 30. *Fort Reliance.* Back and King.
" 31. *Fort Reliance.* Back and King.
Feb. 1. *Fort Reliance.* Back and King.
" 4. *Fort Reliance.* Back and King.
" 6. *Fort Reliance.* Back and King.
" 7. *New York.* Hough.
" 7. *Fort Reliance.* Back and King.
" 8. *New York.* Hough.
" 8. *Fort Reliance.* Back and King.
" 9. *Fort Reliance.* Back and King.
" 10. *Fort Reliance.* Back and King.
" 11. *Fort Reliance.* Back and King.
" 13. *Fort Reliance.* Back and King.
" 14. *Fort Reliance.* Back and King.
" 15. *Fort Reliance.* Back and King.
" 16. *Fort Reliance.* Back and King.
" 20. *G. Britain or Ireland.* Dalton.
" 26. *Fort Reliance.* Back and King.
" 28. *Fort Reliance.* Back and King.
Mar. 2. *New York.* Hough.
" 3. *New York.* Hough.
" 3. *Fort Reliance.* Back and King.
" 4. *New York.* Hough.
" 5. *New York.* Hough. *Newberry.* Johnson.
" 5. *Fort Reliance.* Back and King.
" 6. *New York.* Hough.
" 7. *New York.* Hough.
" 8. *New York.* Hough.
" 8. *Fort Reliance.* Back and King.
" 9. *New York.* Hough.
" 9. *Fort Reliance.* Back and King.
" 10. *New York.* Hough.
" 11. *Fort Reliance.* Back and King.
" 12. *Fort Reliance.* Back and King.
" 14. *Fort Reliance.* Back and King.
" 18. *Fort Reliance.* Back and King.
" 19. *Fort Reliance.* Back and King.
" 20. *Fort Reliance.* Back and King.
" 21. *Fort Reliance.* Back and King.
" 26. *Fort Reliance.* Back and King.
" 27. *Fort Reliance.* Back and King.
" 28. *Fort Reliance.* Back and King.
" 29. *Fort Reliance.* Back and King.
" 30. *Fort Reliance.* Back and King.
" 31. *Fort Reliance.* Back and King.
Apr. 1. *Fort Reliance.* Back and King.
" 2. *Fort Reliance.* Back and King.
" 3. *Fort Reliance.* Back and King.
Apr. 4. *Fort Reliance.* Back and King.
" 5. *New York.* Hough.
" 5. *Fort Reliance.* Back and King.
" 6. *Fort Reliance.* Back and King.
" 8. *Fort Reliance.* Back and King.
" 9. *Fort Reliance.* Back and King.
" 10. *Fort Reliance.* Back and King.
" 11. *Fort Reliance.* Back and King.
" 13. *New York.* Hough.
" 14. *Fort Reliance.* Back and King.
" 15. *Fort Reliance.* Back and King.
" 16. *Fort Reliance.* Back and King.
" 17. *Fort Reliance.* Back and King.
" 18. *Fort Reliance.* Back and King.
" 19. *Fort Reliance.* Back and King.
" 24. *Fort Reliance.* Back and King.
" 25. *Fort Reliance.* Back and King.
" 26. *Fort Reliance.* Back and King.
" 27. *Fort Reliance.* Back and King.
" 29. *Fort Reliance.* Back and King.
" 30. *Fort Reliance.* Back and King.
May 1. *Fort Reliance.* Back and King.
" 3. *New York.* Hough.
June 28. *Brussels.* Quetelet.
July 27. *New York.* Hough.
" 28. *New York.* Hough.
Aug. 11. *New York.* Hough.
" 12. *United States.* Quetelet.[1]
" 31. *New York.* Hough.
Sept. 2. *New York.* Hough.
" 6. *Nova Zembla.* Hough.
" 30. *St. Petersburg.* Wisniewsky. Kupffer.
Oct. 1. *New York.* Hough.
" 3. *New York.* Hough.
" 4. *New York.* Hough.
" 5. *New York.* Hough.
" 6. *New York.* Hough.
" 8. *New York.* Hough.
" 22. *Fort Reliance.* Back and King.
" 23. *New York.* Hough.
" 26. *Fort Reliance.* Back and King.
" 27. *Fort Reliance.* Back and King.
" 29. *New York.* Hough.
Nov. 2. *New York.* Hough.
" 2. *New Haven.* Loomis.
" 3. *New York.* Hough.
" 3. *Manchester.* Dalton. *Moseley.* James, &c.[2]
" 3. *St. Petersburg.* Wisniewsky. Kupffer.

[1] Monatl. Corr. X.
[2] Mem. Lit. and Phil. Soc. Manchest. VI. 617.

Nov. 3. *Fort Reliance.* Back and King.
" 5. *New Haven.* Loomis.
" 6. *New Haven.* Loomis.
" 6. *Fort Reliance.* Back and King.
" 7. *Fort Reliance.* Back and King.
" 10. *Fort Reliance.* Back and King.
" 11. *Fort Reliance.* Back and King.
" 12. *Fort Reliance.* Back and King.
" 13. *Fort Reliance.* Back and King.
" 19. *Fort Reliance.* Back and King.
" 19. *Nova Zembla.* Pakhtoussoff. Kupffer.[1]
" 20. *Fort Reliance.* Back and King.
" 20. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 21. *Fort Reliance.* Back and King.
" 22. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 23. *Fort Reliance.* Back and King.
" 23. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 25. *Fort Reliance.* Back and King.
" 25. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 27. *Fort Reliance.* Back and King.
" 28. *New Haven.* Loomis.
" 28. *Fort Reliance.* Back and King.
" 29. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 30. *Nova Zembla.* Pakhtoussoff. Kupffer.
Dec. 1. *Fort Reliance.* Back and King.
" 2. *Fort Reliance.* Back and King.
" 2. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 3. *New York.* Hough.
" 3. *Fort Reliance.* Back and King.
" 4. *New York.* Hough. *New Haven.* Loomis.
" 4. *Fort Reliance.* Back and King.
" 5. *Fort Reliance.* Back and King.
" 6. *New Haven.* Loomis.
" 6. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 6. *Fort Reliance.* Back and King.
" 7. *Fort Reliance.* Back and King.
" 8. *Fort Reliance.* Back and King.
" 9. *Fort Reliance.* Back and King.
" 9. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 10. *Fort Reliance.* Back and King.
" 12. *Fort Reliance.* Back and King.
" 14. *Fort Reliance.* Back and King.
" 15. *Fort Reliance.* Back and King.
" 16. *Fort Reliance.* Back and King.
" 18. *Fort Reliance.* Back and King.
" 19. *Fort Reliance.* Back and King.
" 20. *New York.* Hough.
" 20. *Fort Reliance.* Back and King.
" 21. *New York.* Hough. *New Haven.* Loomis.

[1] Annuaire Magnet. et Meter. de Russie.

Dec. 21. *Fort Reliance.* Back and King.
" 22. *New York.* Hough. *New Haven.* Loomis.
" 22. *Woolwich.* Sturgeon.[1]
" 22. *Fort Reliance.* Back and King.
" 23. *New York.* Hough. *New Haven.* Loomis.
" 23. *Fort Reliance.* Back and King.
" 24. *Fort Reliance.* Back and King.
" 25. *Fort Reliance.* Back and King.
" 26. *Fort Reliance.* Back and King.
" 27. *Fort Reliance.* Back and King.
" 28. *Fort Reliance.* Back and King.
" 29. *Fort Reliance.* Back and King.
" 30. *Fort Reliance.* Back and King.
" 31. *Fort Reliance.* Back and King.

1835.

Jan. 1. *Fort Reliance.* Back and King.
" 2. *Fort Reliance.* Back and King.
" 3. *Fort Reliance.* Back and King.
" 4. *New York.* Hough.
" 4. *Fort Reliance.* Back and King.
" 5. *New York.* Hough.
" 6. *Fort Reliance.* Back and King.
" 10. *Fort Reliance.* Back and King.
" 14. *Fort Reliance.* Back and King.
" 15. *Fort Reliance.* Back and King.
" 16. *Fort Reliance.* Back and King.
" 18. *New York.* Hough.
" 18. *Fort Reliance.* Back and King.
" 23. *Fort Reliance.* Back and King.
" 24. *Fort Reliance.* Back and King.
" 24. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 25. *Fort Reliance.* Back and King.
" 26. *Fort Reliance.* Back and King.
" 27. *Fort Reliance.* Back and King.
" 28. *Fort Reliance.* Back and King.
" 29. *New York.* Hough.
" 29. *New Haven.* Loomis. *Providence.* Caswell.
" 29. *Hanover, New Hampshire.* Hough.
" 29. *Fort Reliance.* Back and King.
" 30. *Fort Reliance.* Back and King.
" 31. *New York.* Hough.
" 31. *Fort Reliance.* Back and King.
Feb. 1. *Fort Reliance.* Back and King.
" 1. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 2. *Fort Reliance.* Back and King.
" 2. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 3. *Fort Reliance.* Back and King.

[1] Phil. Mag. VI. Third Series, 230.

Feb. 3. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 4. *Fort Reliance.* Back and King.
" 4. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 5. *Nova Zembla.* Pakhtoussoff. Kupffer.
" 6. *Fort Reliance.* Back and King.
" 7. *England.* Hough. Arago.
" 7. *Prussia.* Feldt.[1]
" 8. *Fort Reliance.* Back and King.
" 14. *Fort Reliance.* Back and King.
" 24. *Fort Reliance.* Back and King.
" 25. *New York.* Hough.
" 25. *Fort Reliance.* Back and King.
" 26. *New York.* Hough.
" 26. *Fort Reliance.* Back and King.
" 27. *New York.* Hough.
" 27. *Fort Reliance.* Back and King.
" 28. *Fort Reliance.* Back and King.
Mar. 1. *New York.* Hough.
" 2. *Fort Reliance.* Back and King.
" 3. *Fort Reliance.* Back and King.
" 4. *Fort Reliance.* Back and King.
" 5. *Fort Reliance.* Back and King.
" 6. *Fort Reliance.* Back and King.
" 14. *Fort Reliance.* Back and King.
" 15. *Fort Reliance.* Back and King.
" 16. *Fort Reliance.* Back and King.
" 17. *Fort Reliance.* Back and King.
" 18. *Fort Reliance.* Back and King.
" 30. *New York.* Hough.
Apr. 17. *New York.* Hough.
June 21. *New York.* Hough.
" 28. *New York.* Hough.
July 29. *New York.* Hough.
Aug. 19. *New York.* Hough.
" 22. *New York.* Hough.
Sept. 4. *New York.* Hough. *New Haven.* Loomis.
" 4. *Philadelphia.* Hough.
" 7. *New York.* Hough.
" 9. *New York.* Hough.
" 22. *New York.* Hough.
" 23. *New York.* Hough.
" 24. *New York.* Hough.
" 26. *New York.* Hough.
Oct. 18. *Forli, Roman States.* Hough.
" 27. *New York.* Hough.
Nov. 17. *Boston.* Hale. Lovering.
" 17. *Newberry.* Johnson. *New York.* Hough.

[1] Pogg. Ann. XXXV. 378.

Nov. 17. *New Haven.* Loomis.[1] *Providence.* Caswell.
" 17. *Ashurst.* Snow. *Dunse.* Stevenson.[2]
" 17. *Prussia.* Arago.[3]
" 18. *Boston.* Hale. Lovering.
" 18. *Providence, R. I.* Caswell.
" 18. *New York.* Hough. *New Haven.* Loomis.
" 18. *Edinburgh.* Galbraith.[4] *Dunse.* Stevenson.
" 18. *Woolwich.* Sturgeon. *Armagh.* Robinson.[5]
" 18. *Brussels.* Quetelet. *France.* Arago.
" 19. *New York.* Hough. Quetelet.
" 26. *New York.* Hough.
Dec. 10. *New York.* Hough. Quetelet.
" 10. *New Haven.* Loomis.[6]
" 11. *Canada.* Bonnycastle.[7]
" 21. *New Haven.* Loomis.

1836.

Feb. 11. *New York.* Hough.
" 17. *Newberry.* Johnson.
" 22. *New York.* Hough. *Newberry.* Johnson.
Mar. 17. *New York.* Hough.
Apr. 8. *New York.* Hough.
" 11. *New York.* Hough.
" 12. *New York.* Hough.
" 18. *United States.* Bache.[8]
" 18. *At Sea.* Quetelet.[9]
" 19. *New York.* Hough. Quetelet.
" 20. *New York.* Hough.
" 21. *New York.* Hough. *Maryland.*
" 22. *Boston.* Hale. Lovering.
" 22. *Newberry.* Johnson. *Providence.* Caswell.
" 22. *New Haven.* Loomis.[10]
" 22. *High Barns near Sunderland.* Ettrick.[11]
" 22. *Lat.* 46°. *Long.* 44°. Duhamel. Arago.
" 23. *New York.* Hough.
" 24. *New York.* Hough.
May 7. *New York.* Hough.
" 8. *Providence.* Caswell.

[1] Amer. Journ. Sci. XXIX. 388.
[2] Phil. Mag. Third Series, VI. 21.
[3] Phil. Mag. Third Series, XIX. 579.
[4] Edin. New Phil. Journ. XX. 205.
[5] Phil. Mag. VIII. Third Series, 134, &c. Nov. 16, printed by mistake. See p. 236. Proc. Brit. Assoc. V. 32. Phil. Trans. 1836, p. 31.
[6] Amer. Journ. Sci. XXXII. 217.
[7] Amer. Journ. Sci. XXX. 132.
[8] Bull. de l'Acad. Brux. IV.
[9] Compt. Rend. III. 519.
[10] Amer. Journ. Sci. XXXI. 85.
[11] Phil. Mag. Third Series, IX. 74.

May 8. *New York.* Hough. *New Haven.* Loomis.[1]
" 8. *Canada.* Bonnycastle.
" 13. *New York.* Hough.
" 19. *New York.* Hough. Quetelet.
" 20. ——— Bache.[2]
June 1. *New York.* Hough.
" 4. *New York.* Hough.
" 5. *New York.* Hough.
" 7. *New York.* Hough.
" 8. *New York.* Hough.
" 9. *New York.* Hough.
" 10. *New York.* Hough.
" 11. *New York.* Hough.
" 12. *New York.* Hough.
" 13. *New York.* Hough.
July 3. *New York.* Hough. *Providence.* Caswell.
" 6. *New York.* Hough.
" 10. *New York.* Hough.
" 12. *New York.* Hough.
" 16. *New York.* Hough.
" 19. *New York.* Hough.
" 23. *New York.* Hough.
" 27. *New York.* Hough.
" 30. *New York.* Hough. *Providence.* Caswell.
" 31. *New York.* Hough.
" 31. *New Haven.* Olmsted. Loomis.
Aug. 1. *New York.* Hough.
" 2. *New York.* Hough. *Providence.* Caswell.
" 2. *New Haven.* Olmsted. Loomis.
" 4. *New York.* Hough.
" 10. *Ryde, Isle of Wight.*[3] M. F.
" 11. *New York.* Hough.
" 11. *G. Britain.* Traill.[4]
" 12. *Newberry.* Johnson. *New Haven.* Loomis.[5]
" 13. *New York.* Hough. *Port Henry.* Redfield.[6]
" 14. *New York.* Hough.
" 15. *New York.* Hough.
" 16. *New York.* Hough.
" 17. *New York.* Hough.
" 19. *New York.* Hough.
" 21. *Providence.* Caswell.
" 30. *Newberry.* Johnson.
Sept.13. *New York.* Hough.

[1] Amer. Journ Sci. XXXII. 224.
[2] Bull. de l'Acad. Brux. IV. 72.
[3] Phil. Mag. Third Series, IX. 230.
[4] Proc. Brit. Assoc. V. 32.
[5] Amer. Journ. Sci. XXXII. 220.
[6] Amer. Journ. Sci. XXXIII. 302.

Sept.15. *New York.* Hough.
" 20. *New York.* Hough.
" 29. *Dublin, Ireland.* Mallet.[1]
Oct. 10. *New York.* Hough.
" 11. *Dublin and Leominster.* Gilks.[2]
" 15. *New York.* Hough.
" 18. *St. Petersburg.* Parrot. Kupffer.[3]
" 18. *Brussels.* Quetelet. *Berlin.*[4] *Dorpat.* Struve.
" 18. *France and Italy.* Arago. *Spain.* Rico.
" 20. *New York.* Hough.
" 22. *At Sea. Lat.* 40°*N. Long.* 39°*E.* Darondeau.[5]
" 23. *New York.* Hough.
Nov. 1. *New York.* Hough.
" 2. *New York.* Hough.
" 4. *New York.* Hough.
" 5. *Ouessant.* Darondeau.
" 8. *New York.* Hough.
" 9. *New York.* Hough.
" 13. *New York.* Hough.
" 15. *Brest.*[6]
" 17. ——— Bache.[7]
Dec. 8. *New York.* Hough.

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Jan. 2. *New Haven.* Herrick. Loomis.
" 14. *New York.* Hough.
" 23. *Methye River. Lat.* 56°. *Long.*106.° Simpson.
" 24. *New York.* Hough. Quetelet.
" 25. *New York.* Hough. *Providence.* Caswell.
" 25. *New Haven.* Loomis.[8]
" 25. *Near Bermuda. L.* 22°*N. Lg.* 57. *W.* Emmett.[9]
" 25. *Newberry.* Johnson.
" 26. *New York.* Hough.
" 26. *Newberry.* Johnson.
Feb. 17. *New York.* Hough.
" 18. *New Haven.* Loomis.[10]
" 18. *Brussels.* Quetelet. *Gottingen.*
" 18. *France.* Darlu. Arago.

[1] Phil. Mag. Third Series, X. 75 &c.
[2] Phil. Mag. Third Series, X. 76–7.
[3] Mém. de l'Acad. St. Petersb. III. 469.
[4] Pogg. Ann. XXIX. 201. Edin. New Phil. Journ. XXIV. 222.
[5] Compt. Rend. V. 847.
[6] Compt. Rend. V. 847.
[7] Bull. de l'Acad. Brux. IV. 72.
[8] Amer. Journ. Sci. XXXII. 177.
[9] Amer. Journ. Sci. XII. 42. Phil. Mag. Third Series, XII. 42.
[10] Amer. Journ. Sci. XXXII. 396.

Feb. 18. *Ashhurst.* Snow. *Dublin.* Lloyd.[1]
" 18. *Makerstoun.* Brisbane. *Forli.* Matteucci.[2]
" 18. *Sidmouth.* Heineken. *Belfast.* Stevelly.[3]
" 18. *Catharinebourg.* Kupffer.
" 25. *New York.* Hough.
Mar. 1.[4] *New York.* Hough.
" 3. *New York.* Hough. *Edinburgh.* Necker.[5]
" 9. *New York.* Hough.
" 10. *New York.* Hough.
" 29. *New York.* Hough.
" 29. *New Haven.* Herrick. Newton and Loomis.[6]
" 30. *New York.* Hough.
Apr. 5. *New York.* Hough.
" 6. *New York.* Hough.
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *Newberry.* Johnson.
" 6. *France.* Morren. *Germany.* Quetelet.
" 6. *Christiania.* Hansteen.[7] Arago.
" 7. *Christiania.* Hansteen.
" 8. *Christiania.* Hansteen.
" 10. *New York.* Hough.
" 21. *New York.* Hough. *Newberry.* Johnson.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 25. *New York.* Hough.
" 27. *New York.* Hough.
May 6. *New Haven.* Herrick. Newton and Loomis.
" 19. *England.* Christie.[8]
" 27. *New York.* Hough.
" 30. *New York.* Hough.
" 31. *New York.* Hough.
June 1. *New York.* Hough.
" 2. *New York.* Hough.
" 2. *New Haven.* Herrick. Newton and Loomis.
" 3. *New York.* Hough.
" 24. *Vermont* Hough.
" 24. *England.* Christie.[9]
July 1. *Boston.* Hale. Lovering.
" 1. *New York.* Hough. *Providence.* Caswell.

[1] Phil. Mag. Third Series, XII. 98.
[2] Phil. Mag. Third Series, X. 494.
[3] Athenæum, 1837, p. 42.
[4] An aurora was seen in Spain in the spring of 1837. Mém. de l'Acad. Cienc. Madrid. III. 77.
[5] Ann. Chem. et Phys. Third Series, I. 271.
[6] From Herrick's Auroral Register, published in the Trans. Conn. Acad. I. 9.
[7] Nouv. Mém. de l'Acad. Brux. XX. 103. Bull. de l'Acad. Brux. XXI. Pt. I. 282 &c.
[8] Proc. Brit. Assoc. VI. 29.
[9] Amer. Journ. Sci. XXXIV. 19. Proc. Brit. Assoc. VI. 29.

July 1. *New Haven.* Herrick. Newton and Loomis.
" 1. *Virginia, N. Carolina, and Georgia.* Hough.
" 1. *England.* Christie.[1]
" 2. *New Haven.* Herrick. Newton and Loomis.
" 2. *New York.* Hough. *England.* Christie.
" 3. *New Haven.* Herrick. Newton and Loomis.
" 7. *England.* Christie.
" 25. *New York.* Hough.
" 29. *New Haven.* Herrick. Newton and Loomis.
" 29. *Burlington.* Hough. *Providence.* Caswell.
" 31. *New York.* Hough.
Aug. 3. *New Haven.* Herrick. Newton and Loomis.
" 17. *New York.* Hough.
" 25. *New York.* Hough. *Newberry.* Johnson.
" 25. *New Haven.* Herrick. Newton and Loomis.
" 25. *England.* Christie.[2] *Christiania.* Hansteen.
" 26. *New York.* Hough.
" 27. *New Haven.* Herrick. Newton and Loomis.
" 27. *Christiania.* Hansteen.
" 28. *New York.* Hough.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *Christiania.* Hansteen.
" 29. *New York.* Hough.
" 31. *Christiania.* Hansteen.
Sept. 3. *Yakoutsk.* Kupffer.
" 3. *Christiania.* Hansteen.
" 6. *New York.* Hough.
" 6. *Christiania.* Hansteen.
" 7. *New York.* Hough.
" 8. *Christiania.* Hansteen.
" 9. *Christiania.* Hansteen.
" 11. *Yakoutsk.* Kupffer.
" 18. *New York.* Hough. *Yakoutsk.* Hough.
" 20. *New Haven.* Herrick. Newton and Loomis.
" 20. *New York.* Hough.
" 20. *Christiania.* Hansteen.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *New York.* Hough. *Providence.* Caswell.
" 21. *Christiania.* Hansteen.
" 22. *New Haven?* Herrick. Newton and Loomis.
" 22. *Brussels.* Quetelet.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *New York.* Hough.
" 23. *Christiania.* Hansteeen.
" 23. *Hamburg.* Robert. Arago and Quetelet.
" 24. *New Haven.* Herrick. Newton and Loomis.
" 24. *New York.* Hough. *Providence.* Caswell.

[1] Proc. Brit. Assoc. VI. 29.
[2] Proc. Brit. Assoc. VI. 29.

Sept. 27. *Christiania.* Hansteen.
" 28. *Christiania.* Hansteen.
" 29. *Southampton. Long Island.* Herrick. N. and L.
" 30. *New York.* Hough.
Oct. 5. *Christiania.* Hansteen.
" 5. *Kaafiord, Finmark.* Thomas.[1]
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *New York.* Hough.
" 6. *St. Petersburg.* Kupffer. *Huggate.* Rankin.[2]
" 6. *Kaafiord.* Thomas.
" 8. *Kaafiord.* Thomas.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 18. *Paris.* Mandl. *Dunse.* Stevenson.
" 18. *St. Petersburg and Zlaloouste.* Kupffer.
" 18. *Stockholm.* Hough. *Yakoutsk.* Kupffer.
" 18. Arago and Quetelet.
" 19. *Christiania.* Hansteen.
" 19. *Kaafiord.* Thomas.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *Kaafiord.* Thomas.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 22. *New York.* Hough. *Providence.* Caswell.
" 23. *Christiania.* Hansteen.
" 25. *Christiania.* Hansteen.
" 26. *Kaafiord.* Thomas.
" 30. *Kaafiord.* Thomas.
Nov. 1. *New Haven.* Herrick. Newton and Loomis.
" 1. *Kaafiord.* Thomas.
" 4. *New York.* Hough.
" 5. *Norfolk, Conn.* Herrick. Newton and Loomis.
" 5. *New York.* Hough.
" 5. *Kaafiord.* Thomas.
" 12. *New Haven.* Herrick. Newton and Loomis.
" 12. *New York.* Hough. *Ashurst.* Snow.
" 12. *Brussels.* Quetelet. *Dunse.* Stevenson.
" 12. *France and Italy.* Arago.
" 13. *New York.* Hough.
" 14. *New Haven.*[3] Herrick. Newton and Loomis.
" 14. *New York.* Hough.
" 14. *South Carolina and Georgia.* Hough.
" 14. *G. Britain.* Hough. *Yakoutsk.* Kupffer.
" 14. *Christiania.* Hansteen. *Kaafiord.* Thomas.
" 15. *Yakoutsk.* Kupffer. *Kaafiord.* Thomas.
" 15. *Christiania.* Hansteen.
" 17. *New Haven.* Herrick. Newton and Loomis.
" 18. *New Haven.* Herrick. Newton and Loomis.

[1] Observ. Magnet. Comm. Nord.
[2] Proc. Brit. Assoc. XV. 15.
[3] Amer. Journ. Sci. XXXIV. 267.

Nov. 18. *Yakoutsk.* Kupffer. *Kaafiord.* Thomas.
" 19. *Kaafiord.* Thomas.
" 20. *Kaafiord.* Thomas.
" 21. *Kaafiord.* Thomas.
" 23. *Kaafiord.* Thomas.
" 24. *Kaafiord.* Thomas.
" 26. *Kaafiord.* Thomas.
" 30. *New Haven.* Herrick. Newton and Loomis.
" 30. *Kaafiord.* Thomas.
Dec. 1. *Boston.* Hale. Lovering.
" 1. *New Haven.* Herrick. Newton and Loomis.
" 1. *New York.* Hough. *Providence.* Caswell.
" 2. *Catharinebourg.*[1] Kupffer.
" 2. *Christiania.* Hansteen.
" 2. *Kaafiord.* Thomas. Quetelet.
" 3. *Kaafiord.* Thomas.
" 4. *Boston.* Hale. Lovering.
" 5. *New Haven.* Herrick. Newton and Loomis.
" 11. *Kaafiord.* Thomas.
" 12. *Copenhagen.* Hough.
" 19. *Christiania.* Hansteen.
" 19. *Yakoutsk.* Kupffer.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 30. *New Haven.* Herrick. Newton and Loomis.

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Jan. 3. *Kaafiord.* Thomas.
" 4. *Kaafiord.* Thomas.
" 5. *New Haven.* Herrick. Newton and Loomis.
" 5. *New York.* Hough. *Kaafiord.* Thomas.
" 9. *Kaafiord.* Thomas.
" 11. *Kaafiord.* Thomas.
" 13. *Kaafiord.* Thomas.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *New York.* Hough. *Kaafiord.* Thomas.
" 16. *New Haven.* Herrick. Newton and Loomis.
" 16. *St. Petersburg and Yakoutsk.*[1] Kupffer.
" 16. *Catharinebourg.* Kupffer.
" 16. *Kaafiord.* Thomas. *Zlaloouste.*[1] Kupffer.
" 17. *Yakoutsk.* Kupffer. *Kaafiord.* Thomas.
" 18. *Kaafiord.* Thomas.
" 19. *New York.* Hough. *Kaafiord.* Thomas.
" 20. *Kaafiord.* Thomas.
" 21. *Kaafiord.* Thomas.
" 22. *Kaafiord.* Thomas.
" 24. *New Haven.* Herrick. Newton and Loomis.
" 24. *New York.* Hough.
" 25. *New York.* Hough.

[1] Annuaire Magnet. et Meter. de Russie.

Jan. 25. *Yakoutsk.* Kupffer.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *St. Petersburg*[2] *and Yakoutsk.*[1] Kupffer.
" 29. *Kaafiord.* Thomas.
" 30. *Kaafiord.* Thomas.
" 31. *Kaafiord.* Thomas.
Feb. 3. *New Haven.* Herrick. Newton and Loomis.
" 4. *Providence, R. I.* Caswell.
" 4. *Catharinebourg.* Kupffer.
" 4. *Zlatoouste.* Kupffer.[2]
" 10. *Kaafiord.* Thomas.
" 11. *Kaafiord.* Thomas.
" 15. *Kaafiord.* Thomas.
" 16. *Catharinebourg.* Kupffer.
" 16. *Christiania.* Hansteen. *Kaafiord.* Thomas.
" 17. *Christiania.* Hansteen. *Kaafiord.* Thomas.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 18. *England.* Hough. *Dublin.* Lloyd.[3]
" 20. *New York.* Hough.
" 21. *Boston.* Hale. Lovering.
" 21. *Newberry.* Johnson. *New York.* Hough.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *Christiania.* Hansteen.
" 21. *Catharinebourg.* Kupffer.
" 21. *Barnaoul.* Kupffer.[2] *Kaafiord.* Thomas.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 22. *New York.* Hough. *Yakoutsk.* Kupffer.
" 22. *Christiania.* Hansteen.
" 23. *New York.* Hough. *Yakoutsk.* Kupffer.
" 23. *Christiania.* Hansteen.
" 23. *Catharinebourg.* Kupffer.
" 26. *New Haven.* Herrick. Newton and Loomis.
Mar. 12. *Kaafiord.* Thomas.
" 13. *Kaafiord.* Thomas.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 16. *Christiania.* Hansteen.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *Christiania.* Hansteen.
" 21. *Kaafiord.* Thomas.
" 22. *Kaafiord.* Thomas.
" 23. *Yakoutsk.* Kupffer. *Kaafiord.* Thomas.
" 24. *Kaafiord.* Thomas.
" 26. *Yakoutsk.* Kupffer. *Christiania.* Hansteen.
" 30. *Yakoutsk.* Kupffer. *Kaafiord.* Thomas.
" 30. *Catharinebourg.* Kupffer.
" 31. *Yakoutsk.* Kupffer.
Apr. 12. *New Haven.* Herrick. Newton and Loomis.

[1] Annuaire Magnet. et Meteor. de Russie, 1839, p. 423.
[2] Annuaire Magnet. et Meteor. de Russie, 1838, p. 26, 174 et 221.
[3] Phil. Mag. Third Series, XII. 98.

Apr. 12. *New York.* Hough. *Newberry.* Johnson.
" 12. *Christiania.* Hansteen.
" 13. *Christiania.* Hansteen.
" 15. *New York.* Hough.
" 17. *Christiania.* Hansteen.
" 19. *Christiania.* Hansteen.
" 29. *New Haven.* Herrick. Newton and Loomis.
" 29. *New York.* Hough. *Brussels.* Quetelet.[1]
" 29. *Catharinebourg.* Kupffer.
" 30. *New Haven.* Herrick. Newton and Loomis.
" 30. *New York.* Hough. *Newberry.* Johnson.
" 30. *Providence, R. I.* Caswell.
May 1. *Newberry.* Johnson.
" 2. *New York.* Hough.
" 13. *Providence, R. I.* Caswell.
" 14. *New Haven.* Herrick. Newton and Loomis.
June 25. *New Haven.* Herrick. Newton and Loomis.
" 25. *New York.* Hough.
" 26. *New Haven.* Herrick. Newton and Loomis.
" 26. *New York.* Hough. *Providence.* Caswell.
" 26. *Macao, East Indies.* Hough.
" 27. *New York.* Hough.
July 13. *New Haven.* Herrick. Newton and Loomis.
" 14. *New York.* Hough.
" 15. *Boston.* Hale. Lovering.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *New York.* Hough.
" 27. *New Haven.* Herrick. Newton and Loomis.
" 27. *New York.* Hough.
" 29. *New Haven.* Herrick. Newton and Loomis
" 29. *New York.* Hough.
Aug. 13. *New York.* Hough.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 22. *New York.* Hough. *Providence.* Caswell.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *Christiania.* Hansteen. *Yakoutsk.* Kupffer.
" 23. *Catharinebourg.* Kupffer.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *New York.* Hough.
Sept. 5. *New Haven.* Herrick. Newton and Loomis.
" 7. *New York.* Hough.
" 7. *New Haven.* Herrick. Newton and Loomis.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 12. *New York.* Hough. *Christiania.* Hansteen.
" 12. *Catharinebourg.* Kupffer.
" 12. *Bossekop, Finland.* Lottin, &c.[2]
" 13. *Boston.* Hale. Lovering.
" 13. *New Haven.* Herrick. Newton and Loomis.

[1] Bull. de l'Acad. Brux. V. 284.
[2] Observ. Magnet. Comm. Nord.

Sept. 13. *New York.* Hough. *Paris.* Bouvard.[1]
" 13. *Bossekop.* Lottin. *Ashurst.* Snow.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *Richmond, Kentucky.* Herrick. N. and L.
" 14. *Newberry.* Johnson. *Providence.* Caswell.
" 14. *New York.* Hough.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *Newberry.* Johnson. *New York.* Hough.
" 15. *Washington, D. C.* Gilliss.[2]
" 15. *Christiania.* Hansteen. *Paris.* Bouvard.
" 15. *Kaafiord.* Thomas. *Bossekop.* Lottin.
" 16. *Boston.* Hale. Lovering.
" 16. *New Haven.* Herrick. Newton and Loomis.
" 16. *New York.* Hough. *Washington.* Gilliss.
" 16. *Christiania.* Hansteen. *Newberry.* Johnson.
" 16. *Kaafiord.* Thomas. *Bossekop.* Lottin.
" 17. *New Haven.* Herrick. Newton and Loomis.
" 17. *New York.* Hough. *Washington.* Gilliss.
" 17. *Kaafiord.* Thomas. *Bossekop.* Lottin.
" 18. *New York.* Hough. *Bossekop.* Lottin.
" 18. *Catharinebourg.* Kupffer.
" 19. *New York.* Hough. *Bossekop.* Lottin.
" 20. *Providence, R. I.* Caswell.
" 20. *New York.* Hough. *Bossekop.* Lottin.
" 21. *Catharinebourg.* Kupffer.
" 21. *Bossekop.* Lottin.
" 23. *Bossekop.* Lottin.
" 24. *Christiania.* Hansteen.
" 24. *Kaafiord.* Thomas. *Bossekop.* Lottin.
" 26. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 28. *Kaafiord.* Thomas. *Bossekop.* Lottin.
" 29. *Bossekop.* Lottin.
" 30. *Kaafiord.* Thomas. *Bossekop.* Lottin.
Oct. 1. *Bossekop.* Lottin.
" 7. *Christiania.* Hansteen.
" 11. *Barnaoul.* Kupffer. *Bossekop.* Lottin.
" 12. *Bossekop.* Lottin.
" 13. *Christiania.* Hansteen.
" 14. *Bossekop.* Lottin.
" 15. *Bossekop.* Lottin.
" 16. *New Haven.* Herrick. Newton and Loomis.
" 16. *New York.* Hough. *Providence.* Caswell.
" 16. *Bossekop.* Lottin.
" 17. *Catharinebourg.* Kupffer.
" 17. *Zlatoouste.* Kupffer. *Bossekop.* Lottin.
" 18. *Bossekop.* Lottin.
" 20. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 20. *Bossekop.* Lottin.

[1] Connaiss. de Tems. 1842, p. 392.
[2] Magnet. and Meteor. Observ. Washington. p. 352.

Oct. 22. *Bossekop.* Lottin.
" 23. *Bossekop.* Lottin.
" 24. *Bossekop.* Lottin.
" 25. *Bossekop.* Lottin.
" 27. *Bossekop.* Lottin.
" 28. *Bossekop.* Lottin.
" 30. *Bossekop.* Lottin.
" 31. *Bossekop.* Lottin.
Nov. 1. *Bossekop.* Lottin.
" 2. *Bossekop.* Lottin.
" 5. *Bossekop.* Lottin.
" 8. *Bossekop.* Lottin.
" 9. *New York.* Hough.
" 10. *Bossekop.* Lottin.
" 11. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 12. *Boston.* Hale. Lovering.
" 12. *New Haven.* Herrick. Newton and Loomis.
" 12. *Providence, R. I.* Caswell.
" 12. *Gerhardt.* Eutin. Quetelet.[1]
" 12. *Bossekop.* Lottin. *Slough.* Herschel.
" 13. *New Haven.* Herrick. Newton and Loomis.
" 13. *Kingussie, Scotland.* Rutherford.[2]
" 13. *Bossekop.* Lottin. *Paris.* Bouvard.
" 14. *Boston.* Hale. Lovering. *New York.* Hough.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 15. *Bossekop.* Lottin.
" 17. *Kingussie.* Rutherford.
" 17. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 18. *Bossekop.* Lottin.
" 19. *Bossekop.* Lottin.
" 21. *Bossekop.* Lottin.
" 22. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 24. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 25. *Boston.* Hale. Lovering. *Bossekop.* Lottin.
" 25. *New Haven.* Herrick. Newton and Loomis.
" 25. *New York.* Hough. *Washington.* Gilliss.
" 26. *New York.* Hough. *Bossekop.* Lottin.
" 27. *Bossekop.* Lottin.
" 30. *Bossekop.* Lottin.
Dec. 2. *Bossekop.* Lottin.
" 3. *Bossekop.* Lottin.
" 4. *Bossekop.* Lottin.
" 5. *Bossekop.* Lottin.
" 7. *Bossekop.* Lottin.
" 8. *Bossekop.* Lottin.
" 9. *Bossekop.* Lottin.
" 10. *Bossekop.* Lottin.

[1] Pogg. Ann. XLVI. 662.
[2] Proc. Brit. Assoc. VIII. 29.

Dec. 11. *Bossekop.* Lottin.
" 12. *Bossekop.* Lottin.
" 13. *New Haven.* Herrick. Newton and Loomis.
" 13. *New York.* Hough. *Newberry.* Johnson.
" 13. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 14. *New York.* Hough. *Newberry.* Johnson.
" 14. *Kingussie.* Rutherford.
" 14. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 15. *New York.* Hough. *Bossekop.* Lottin.
" 16. *Bossekop.* Lottin.
" 17. *Bossekop.* Lottin.
" 19. *Bossekop.* Lottin.
" 20. *Bossekop.* Lottin. *Alford.* Farquharson.[1]
" 21. *Bossekop.* Lottin.
" 22. *Bossekop.* Lottin.
" 23. *Bossekop.* Lottin.
" 24. *Bossekop.* Lottin.
" 25. *Bossekop.* Lottin.
" 27. *Bossekop.* Lottin.
" 28. *Bossekop.* Lottin.
" 30. *Bossekop.* Lottin.

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Jan. 1. *Bossekop.* Lottin.
" 2. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 3. *Bossekop.* Lottin.
" 5. *New York.* Hough.
" 6. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 7. *Bossekop.* Lottin.
" 9. *Bossekop. Jupvig, Finmark.* Lottin &c.[2]
" 10. *New Haven.* Herrick. Newton and Loomis.
" 10. *New York.* Hough. *Providence.* Caswell.
" 10. *Jupvig.* Lottin, &c. Quetelet.
" 11. *New York.* Hough.
" 11. *Bossekop and Jupvig.* Lottin.
" 12. *Bossekop and Jupvig.* Lottin.
" 13. *New York.* Hough.
" 13. *Bossekop and Jupvig?* Lottin.
" 14. *Boston.* Hale. Lovering.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *New York.* Hough. *Newberry.* Johnson.
" 14. *Providence, R. I.* Caswell.
" 14. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 15. *Edinburgh.* Necker.
" 15. *Bogoslowski.* Kupffer.[3] *Bossekop.* Lottin.
" 16. *New Haven.* Herrick. Newton and Loomis.
" 16. *New York.* Hough.

[1] Phil. Trans. 1839, p. 277.
[2] Observ. Magnet. Comm. Nord.
[3] Annuaire Magnet. et Meteor. de Russie, 1839, p. 283.

Jan. 25. *Christiania.* Hansteen. *Edinburgh.* Necker.
" 16. *Bossekop and Jupvig.* Lottin.
" 17. *Bossekop and Jupvig.* Lottin.
" 18. *New York.* Hough. *England.* Hough.
" 18. *Bossekop and Jupvig.* Lottin.
" 19. *Boston.* Hale. Lovering.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *New York.* Hough. *Providence.* Caswell.
" 19. *Washington, D. C.* Gilliss.
" 19. *Brussels.* Quetelet. *Ashurst.* Snow.
" 19. *Christiania.* Hansteen. *Edinburgh.* Necker.[1]
" 19. *Bossekop and Jupvig.* Lottin.
" 20. *Christiania.* Hansteen.
" 20. *Bossekop and Jupvig.* Lottin.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *New York.* Hough.
" 21. *Bossekop and Jupvig.* Lottin.
" 22. *Bossekop.* Lottin.
" 23. *Bossekop.* Lottin.
" 24. *Bossekop.* Lottin.
" 29. *Bossekop.* Lottin.
Feb. 1. *Bossekop.* Lottin.
" 2. *Bossekop.* Lottin.
" 3. *Bossekop.* Lottin.
" 4. *New Haven.* Herrick. Newton and Loomis.
" 4. *New York.* Hough. *Bossekop.* Lottin.
" 5. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 6. *Bossekop.* Lottin.
" 7. *Bossekop.* Lottin.
" 9 *New York.* Hough. *Bossekop.* Lottin.
" 10. *Bossekop.* Lottin.
" 11. *Bossekop.* Lottin. *Edinburgh.* Necker.
" 12. *Bossekop.* Lottin.
" 13. *Bossekop.* Lottin.
" 16. *Bossekop.* Lottin.
" 17. *Bossekop.* Lottin. *Edinburgh.* Necker.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 18. *Christiania.* Hansteen. *Edinburgh.* Necker.
" 18. *Bossekop.* Lottin.
" 19. *New York.* Hough.
" 19. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 20. *Bossekop.* Lottin.
" 21. *Eutin, Holstein.* Roth. Schmidt.[2]
" 21. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 22. *Barnaoul.* Kupffer.[3] *Bossekop.* Lottin.
" 23. *Bossekop.* Lottin.

[1] Ann. Chem. et Phys. Third Series, I. 270.
[2] Grunert. Arch. Math. und Phys. XXVI. 74.
[3] Annuaire Magnet. et Meteor. de Russie, 1839, p. 170.

Feb. 24. *Bossekop.* Lottin.
" 26. *Bossekop.* Lottin.
" 27. *Bossekop.* Lottin.
" 28. *Bossekop.* Lottin.
Mar. 1. *Bossekop.* Lottin.
" 2. *Bossekop.* Lottin.
" 3. *Bossekop.* Lottin.
" 4. *Bossekop.* Lottin.
" 5. *New York.* Hough. *Providence.* Caswell.
" 5. *Fort Confidence.* Simpson.[1]
" 5. *Bossekop.* Lottin.
" 6. *Bossekop.* Lottin. *Portobello.* Necker.
" 7. *Bossekop.* Lottin.
" 8. *Bossekop.* Lottin.
" 9. *Bossekop.* Lottin.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 10. *New York.* Hough. *Bossekop.* Lottin.
" 11. *Bossekop.* Lottin.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *New York.* Hough. *Newberry.* Johnson.
" 15. *Bossekop.* Lottin.
" 16. *New York.* Hough.
" 16. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 17. *Bossekop.* Lottin.
" 18. *Christiania.* Hansteen. *Bossekop.* Lottin.
" 18. *Portobello.* Necker.
" 19. *New York.* Hough. *Bossekop.* Lottin.
" 20. *Bossekop.* Lottin.
" 21. *Bossekop.* Lottin.
" 22. *Washington, D. C.* Gilliss.
" 23. *Bossekop.* Lottin.
" 24. *New York.* Hough. *Bossekop.* Lottin.
" 25. *Bossekop.* Lottin. *Portobello.* Necker.
" 26. *Bossekop.* Lottin.
" 27. *Bossekop.* Lottin.
" 31. *Christiania.* Hansteen. *Bossekop.* Lottin.
Apr. 1. *Bossekop.* Lottin.
" 2. *Bossekop.* Lottin.
" 3. *New York.* Hough. *Bossekop.* Lottin.
" 5. *Bossekop.* Lottin.
" 6. *Bossekop.* Lottin.
" 7. *New York.* Hough. *Bossekop.* Lottin.
" 8. *New Haven.* Herrick. Newton and Loomis.
" 8. *New York.* Hough. *Bossekop.* Lottin.
" 8. *Christiania.* Hansteen.
" 9. *Christiania.* Hansteen.

[1] Simpson says of the aurora at Fort Confidence, Lat. 67° N. Long. 119°. E.: "Every clear night, when not eclipsed by the moon, it was to be seen; but was *brightest* and most active in the mornings some time before daylight." Narrative of the Discov. in N. C. Amer. p. 330.

Apr. 11. *Portobello.* Necker.
" 12. *Christiania.* Hansteen.
" 13. *New York.* Hough. *Bossekop.* Lottin.
" 13. *Christiania.* Hansteen.
" 14. *Christiania.* Hansteen.
" 15. *New York.* Hough.
" 16. *Newberry.* Johnson. *Bossekop.* Lottin
" 17. *Bossekop.* Lottin.
" 18. *Bossekop.* Lottin.
" 20. *New York.* Hough.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *Newberry.* Johnson.
" 22. *New York.* Hough.
" 28. *Newberry.* Johnson.
May 4. *New York.* Hough.
" 5. *New Haven.* Herrick. Newton and Loomis.
" 5. *New York.* Hough. *Christiania.* Hansteen.
" 5. *Brussels.* Quetelet. Arago.
" 7. *France and Italy.* Arago.
" 7. *Saint Brice.* Lalanne.
" 9. *New Haven.* Herrick. Newton and Loomis.
" 10. *New York.* Hough. *Providence.* Caswell.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 11. *New York.* Hough. *Boston.*
" 11. *Worcester.*[1] Herrick. Newton and Loomis.
" 12. *New York.* Hough.
" 14. *New York.* Hough.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *Providence, R. I.* Caswell.
" 16. *New York.* Hough.
" 17. *New York.* Hough.
" 31. *New Haven.* Herrick. Newton and Loomis.
June 6. *New Haven.* Herrick. Newton and Loomis.
" 7. *New York.* Hough. *Washington.* Gilliss.
" 7. *New Haven.* Herrick. Newton and Loomis.
" 12. *New York.* Hough.
July 3. *New Haven.* Herrick. Newton and Loomis.
" 3. *New York.* Hough.
" 4. *New York.* Hough.
" 30. *New Haven.* Herrick. Newton and Loomis.
Aug. 10. *New Haven.* Herrick. Newton and Loomis.
" 10. *New York.* Hough.
" 20. *New Haven.* Herrick. Newton and Loomis.
" 20. *New York.* Hough.
" 21. *Scandinavia.* Lottin, &c.[2]
" 21. *Mt. Ord of Caithness, Scotl.* Necker.
" 22. *New York.* Hough.

[1] Med. and Surg. Journ. Boston. XX. 291.
[2] Observ. Magnet. Comm. Nord.

Aug. 23. *Scandinavia.* Lottin.
" 27. *Scandinavia.* Lottin.
" 28. *New York.* Hough. *Newberry?* Hough.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *Washington, D. C.* Gilliss.
" 29. *New York.* Hough.
" 30. *Scandinavia.* Lottin.
" 31. *New Haven.* Herrick. Newton and Loomis.
" 31. *New York.* Hough.
Sept. 1. *Dorchester.* Bond. Lovering.
" 1. *New Haven.* Herrick. Newton and Loomis.
" 3. *Boston.* Hale. Lovering.
" 3. *Dorchester.* Bond. Lovering.
" 3. *Providence.* Caswell. *Newberry.* Johnson.
" 3. *Washington.* Gilliss. *New York.* Hough.
" 3. *New Haven.* Herrick. Newton and Loomis.
" 3. *New Orleans and Nashville.* Hough.
" 3. *Near London.* Sturgeon. *Paris.* Bouvard.[1]
" 3. *Brussels.* Quetelet. Arago. *Piedmont.*
" 3. *Sky.* Necker. *Ashurst.* Snow.
" 3. *Dunse.* Stevenson. *Scandinavia.* Lottin.
" 4. *Providence, R. I.* Caswell.
" 4. *New York.* Hough. *Newberry.* Johnson.
" 4. *Sky.* Necker. *Dunse.* Stevenson.
" 4. *Scandinavia.* Lottin. *Paris.* Bouvard.
" 6. *New York.* Hough.
" 7. *Scandinavia.* Lottin.
" 8. *Bogoslowski.* Kupffer.
" 10. *Christiania.* Hansteen. *Scandinavia.* Lottin.
" 13. *Lapland.* Bravais. Hough and Boué.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *Providence.* Caswell. *Newberry.* Johnson.
" 14. *New York.* Hough. *Washington.* Gilliss.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *Scandinavia.* Lottin.
" 17. *Scandinavia.* Lottin.
" 18. *Scandinavia.* Lottin.
" 19. *Scandinavia.* Lottin.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 20. *Scandinavia.* Lottin.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *Scandinavia.* Lottin. *Sky.* Necker.
" 23. *Scandinavia.* Lottin.
" 24. *Scandinavia.* Lottin. *Sky.* Necker.
" 28. *Dorchester.* Bond. Lovering.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *New York.* Hough.
Oct. 1. *New York.* Hough. *Kaafiord.* Thomas.
" 2. *Kaafiord.* Thomas.

[1] Connais. de Tems. 1843, p. 408.

Oct. 4. *New York.* Hough. *Kaafiord.* Thomas.
" 5. *Scandinavia.* Lottin. *Kaafiord.* Thomas.
" 6. *Kaafiord.* Thomas.
" 7. *Kaafiord.* Thomas.
" 8. *New Haven.* Herrick. Newton and Loomis.
" 8. *Christiania.* Hansteen.
" 8. *Scandinavia.* Lottin. *Kaafiord.* Thomas.
" 9. *Kaafiord.* Thomas.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 10. *New York.* Hough.
" 10. *Scandinavia.* Lottin. *Kaafiord.* Thomas.
" 11. *New Haven.* Herrick. Newton and Loomis.
" 11. *Kaafiord.* Thomas.
" 12. *Christiania.* Hansteen. *Sky.* Necker.
" 12. *Scandinavia.* Lottin. *Kaafiord.* Thomas.
" 13. *Kaafiord.* Thomas. *Scandinavia.* Lottin.
" 13. *Christiania.* Hansteen. *Sky.* Necker.
" 14. *New York.* Hough. *Kaafiord.* Thomas.
" 15. *Scandinavia.* Lottin. *Kaafiord.* Thomas.
" 16. *Kaafiord.* Thomas.
" 17. *Kaafiord.* Thomas.
" 18. *Kaafiord.* Thomas. *Scandinavia.* Lottin.
" 20. *Kaafiord.* Thomas.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 22. *New York.* Hough.
" 22. *Brussels.* Quetelet. *France.* Arago.
" 22. *Rome.* Matteucci. *Eutin.* Roth. Schmidt.
" 22. *Kaafiord.* Thomas. *Paris.* Bouvard.
" 23. *Kaafiord.* Thomas. *Eutin.* Roth. Schmidt.
" 24. *Kaafiord.* Thomas.
" 26. *Kaafiord.* Thomas.
" 27. *Sky.* Necker.
" 28. *Christiania.* Hansteen.
" 28. *Sky.* Necker. Arago. *Kaafiord.* Thomas.
" 30. *Kaafiord.* Thomas.
" 31. *Spain.* Rico.[1]
Nov. 1. *Kaafiord* Thomas. *Eutin.* Roth. Schmidt.
" 2. *Kaafiord.* Thomas.
" 3. *Christiania.* Hansteen.
" 4. *New Haven.* Herrick. Newton and Loomis.
" 4. *New York.* Hough. *Christiania.* Hansteen.
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *Kaafiord.* Thomas. *Bogoslowski.* Kupffer.
" 7. *Kaafiord.* Thomas.
" 8. *New Haven.* Herrick. Newton and Loomis.
" 8. *Kaafiord.* Thomas.
" 10. *Christiania.* Hansteen. *Kaafiord.* Thomas.
" 11. *New Haven.* Herrick. Newton and Loomis.

[1] Mem. Acad. Cienc. Madrid. III. 77.

Nov. 11. *Bogoslowski.* Kupffer. *Kaafiord.* Thomas.
" 13 *Dorchester.* Bond. Lovering. *Sky.* Necker.
" 13. *Christiania.* Hansteen. *Kaafiord.* Thomas.
" 15. *Kaafiord.* Thomas.
" 16. *Kaafiord.* Thomas.
" 17. *New Haven.* Herrick. Newton and Loomis.
" 17. *Bogoslowski.* Kupffer. *Dunse.* Stephenson.
" 18. *New York.* Hough. *Newberry.* Johnson.
" 19. *Kaafiord.* Thomas.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *Bogoslowski.* Kupffer. *Kaafiord.* Thomas.
" 26. *Kaafiord.* Thomas.
" 29. *Kaafiord.* Thomas.
" 30. *New York.* Hough. *Kaafiord.* Thomas.
Dec. 1. *Christiania.* Hansteen. *Kaafiord.* Thomas.
" 2. *Kaafiord.* Thomas.
" 4. *New Haven.* Herrick. Newton and Loomis.
" 4. *Christiania.* Hansteen. *Kaafiord.* Thomas.
" 5. *Kaafiord.* Thomas.
" 6. *New York.* Hough.
" 8. *Kaafiord.* Thomas.
" 9. *Kaafiord.* Thomas.
" 14. *Gosport.*[1] Burney.
" 18. *Bogoslowski.* Kupffer.
" 20. *Kaafiord.* Thomas.
" 21. *Dorchester.* Bond. Lovering.
" 24. *Kaafiord.* Thomas.
" 25. *Kaafiord.* Thomas.
" 26. *Kaafiord.* Thomas. *Bogoslowski.* Kupffer.
" 29. *Kaafiord.* Thomas.
" 30. *Kaafiord.* Thomas.
" 31. *New Haven.* Herrick. Newton and Loomis.
" 31. *Kaafiord.* Thomas. *Sky.* Necker.

1840.

Jan. 1. *Nijne-Taguilsk, Mt. Ourals.* Demidoff.[2]
" 2. *Newberry.* Johnson.
" 3. *New Haven.* Herrick. Newton and Loomis.
" 3. *New York.* Hough. *Newberry.* Johnson.
" 3. *Huggate.* Rankin.[3] *Scandinavia.* Lottin.
" 3. *Sky.* Necker. *Geneva.* Plantamour.
" 3. *Christiania.* Hansteen.
" 4. *New Haven.* Herrick. Newton and Loomis.
" 4. *New York.* Hough. *Newberry.* Johnson.
" 4. *Sky.* Necker. *Dunse.* Stevenson. Arago.
" 4. *Christiania.* Hansteen.
" 4. *Bogoslowski and Zlatoouste.* Kupffer.[4]

[1] Phil. Mag. Second Series, VII. 158.
[2] L'Institut. Sci. Math. Phys. &c. IX. 154.
[3] Proc. Brit. Assoc. XV. 15.
[4] Annuaire Magnet. et Meteor. de Russie, 1840, pp. 128 et 289.

Jan. 5. *New Haven.* Herrick. Newton and Loomis.
" 5. *New York.* Hough. *Toronto.* Hough.
" 5. *Christiania.* Hansteen. *Sky.* Necker.
" 8. *New York.* Hough.
" 25. *Christiania.* Hansteen.
" 26. *Nijne-Taguilsk.* Demidoff.
" 28. *Christiania.* Hansteen. *Kaafiord.* Ihle. Reich.[1]
" 29. *Christiania.* Hansteen.
" 30. *New Haven.* Herrick. Newton and Loomis.
" 30. *New York.* Hough. *Providence.* Caswell.
" 31. *New Haven.* Herrick. Newton and Loomis.
" 31. *New York.* Hough.
Feb. 5. *New York.* Hough.
" 6. *Cambridge.* Bond. Lovering.
" 6. *Bogoslowski.* Kupffer.
" 6. *Jakobshavn, Greenland.* Rudolph.[2]
" 7. *Cambridge.* Bond. Lovering.
" 7. *New Haven.* Herrick. Newton and Loomis.
" 7. *New York.* Hough. *Providence.* Caswell.
" 7. *Catharinebourg.* Kupffer.
" 7. *Zlatoouste.* Kupffer.
" 15. *New York.* Hough.
" 18. *Christiania.* Hansteen.
" 20. *Christiania.* Hansteen.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *New York.* Hough.
" 22. *Christiania.* Hansteen.
" 24. *New York.* Hough.
" 25. *Christiania.* Hansteen. *Sky?* Necker.
" 25. *Bogoslowski.* Kupffer.
" 26. *Christiania.* Hansteen.
" 27. *Christiania.* Hansteen. *Sky.* Necker.
" 28. *Sky?* Necker.[3]
Mar. 2. *Sky?* Necker. *Jakobshavn.* Rudolph.
" 5. *New Haven.* Herrick. Newton and Loomis.
" 5. *New York.* Hough. *Washington.* Gilliss.
" 5. *Providence, R. I.* Caswell. *Toronto.* Sabine.[4]
" 6. *Toronto.* Sabine.
" 8. *New York.* Hough.
" 9. *Kaafiord.* Thomas.
" 12. *New York.* Hough.
" 13. *New York.* Hough. *Christiania.* Hansteen.
" 19. *Christiania.* Hansteen.
" 20. *Christiania.* Hansteen.
" 20. *Kaafiord.* Thomas. *Sky.* Necker.
" 21. *Christiania.* Hansteen. *Kaafiord.* Thomas.

[1] Edin. New Phil. Journ. XXXV. 384.
[2] Collect. Meteor. Soc. Sci. Danicæ. Fasc. IV. 82.
[3] Compt. Rend. XII. 347.
[4] Magnet. and Meteor. Observ. Toronto, I. 50.

Mar. 22. *Cambridge.* Bond. Lovering.
" 22. *New York.* Hough.
" 22. *Christiania.* Hansteen. *Kaafiord.* Thomas, &c.
" 23. *Christiania.* Hansteen. *Kaafiord.* Thomas.
" 24. *New York.* Hough. *Kaafiord.* Thomas.
" 25. *New York.* Hough. *Toronto.* Hough.
" 25. *Christiania.* Hansteen. *Kaafiord.* Thomas.
" 26. *New York.* Hough.
" 26. *Christiania.* Hansteen. *Sky?* Necker.
" 27. *Christiania.* Hansteen.
" 28. *Christiania.* Hansteen. *Sky.* Necker.
" 29. *Cambridge.* Bond. Lovering.
" 29. *Christiania.* Hansteen.
" 31. *New Haven.* Herrick. Newton and Loomis.
Apr. 1. *New Haven.* Herrick. Newton and Loomis.
" 1. *New York.* Hough. *Toronto.* Sabine.
" 1. *Christiania.* Hansteen.
" 2. *New York.* Hough.
" 4. *New Haven.* Herrick. Newton and Loomis.
" 4. *Providence, R. I.* Caswell.
" 4. *New York.* Hough. *Toronto?* Hough.
" 5. *New York.* Hough.
" 9. *New York.* Hough.
" 18. *Christiania.* Hansteen.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *New York.* Hough.
" 20. *New Haven.* Herrick. Newton and Loomis.
" 20. *New York.* Hough.
" 21. *New York.* Hough.
" 23. *New York.* Hough.
" 24. *Cambridge.* Lovering.[1] Bond.
" 24. *New Haven.* Herrick. Newton and Loomis.
" 24. *Newberry.* Johnson. *New York.* Hough.
" 24. *Christiania.* Hansteen.
May 1. *New Haven.* Herrick. Newton and Loomis.
" 1. *New York.* Hough.
" 6. *New York.* Hough.
" 17. *New York.* Hough.
" 20. *New York.* Hough.
" 23. *New York.* Hough.
" 23. *Caraccas, S. America.* Cagigal. Arago.
" 27. *New York.* Hough. *Toronto.* Sabine.
" 28. *Cambridge.* Lovering. *New York.* Hough.
" 29. *Cambridge.* Lovering.
" 29. *Boston.* Hale. Lovering.
" 29. *New Haven.* Herrick.[2] Newton and Loomis.
" 29. *New York.* Hough. *Providence.* Caswell.

[1] Mem. Amer. Acad. II. 52.
[2] Amer. Journ. Sci. XXXIX. 194 and 383. XL. 337.

May 29. *Toronto.* Sabine. *Paris.* Bouvard.[1]
" 30. *New Haven.* Herrick. Newton and Loomis.
" 30. *New York.* Hough. *Canada.* Riddell.
June 1. *Cambridge.* Bond. Lovering.
" 10. *New York.* Hough.
" 22. *Cambridge.* Bond. Lovering.
" 25. *New York.* Hough.
" 26. *Cambridge.* Lovering.
" 28. *New York.* Hough.
July 4. *Cambridge.* Lovering. *New York.* Hough.
" 16. *New Haven.* Herrick. Newton and Loomis.
" 21. *Toronto.* Sabine.
" 25. *New Haven.* Herrick. Newton and Loomis.
" 25. *New York.* Hough.
" 29. *Cambridge.* Lovering. Bond.
" 29. *New Haven.* Herrick. Newton and Loomis.
" 29. *Providence, R. I.* Caswell. *New York.* Hough.
Aug. 9. *New York.* Hough.
" 10. *New York.* Hough.
" 19. *Cambridge.* Lovering.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *New York.* Hough. *Toronto.* Sabine.
" 20. *New York.* Hough.
" 21. *New York.* Hough.
" 23. *New York.* Hough.
" 24. *New Haven.* Herrick. Newton and Loomis.
" 24. *Toronto.* Sabine.
" 25. *New York.* Hough.
" 26. *New York.* Hough.
" 26. *Christiania.* Hansteen.
" 28. *Cambridge.* Lovering. *Washington.* Gilliss.
" 28. *Boston.* Hale. Lovering.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *New York.* Hough. *Toronto.* Sabine.[2]
" 28. *Christiania.* Hansteen.
" 29. *New Haven.* Herrick. Newton and Loomis.
" 31. *Cambridge.* Bond. Lovering.
Sept. 1. *New York.* Hough. *Newberry.* Johnson.
" 2. *Toronto.* Sabine.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 21. *Cambridge.* Bond. Lovering.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *New York.* Hough. *Washington.* Gilliss.
" 21. *Toronto.* Sabine. *Paris.* Bouvard.
" 21. *Christiania.* Hansteen. *Brussels.* Quetelet.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 23. *New York.* Hough. *Washington.* Gilliss.

[1] Connaiss. de Tems. 1844, p. 408.
[2] Compt. Rend. XIII. 724–5.

Sept. 24. *New York.* Hough.
" 25. *Jakobshavn.* Rudolph.
" 25. *New York.* Hough. *Toronto.* Sabine.
" 27. *Toronto.* Sabine.
" 30. *Christiania.* Hansteen.
Oct. 2. *New York.* Hough.
" 4. *Jakobshavn.* Rudolph.
" 11. *New York.* Hough.
" 18. *Christiania.* Hansteen.
" 19. *New York.* Hough. *Toronto.* Sabine.
" 19. *Parma.* Colla.[1] *Jakobshavn.* Rudolph.
" 20. *New York.* Hough. *Newberry.* Johnson.
" 21. *New York.* Hough. *Paris.* Bouvard.
" 22. *Cambridge.* Lovering. *Newberry.* Johnson.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 22. *Christiania.* Hansteen. *Italy?* Hough.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *New York.* Hough.
" 27. *New Haven.* Herrick. Newton and Loomis.
" 29. *Brussels.* Quetelet. *Italy?* Hough.
" 31. *New Haven.* Herrick. Newton and Loomis.
Nov. 12. *Paris.* Laugier. Boué.
" 13. *New Haven.* Herrick. Newton and Loomis.
" 13. *New York.* Hough. *Toronto.* Sabine.
" 13. *Providence, R. I.* Caswell.
" 13. *Washington, D. C.* Gilliss.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *New York.* Hough. *Providence.* Caswell.
" 17. *New York.* Hough. *Dunse.* Stevenson.
" 19. *New York.* Hough.
" 20. *New Haven.* Herrick. Newton and Loomis.
" 20. *New York.* Hough. *Jakobshavn.* Rudolph.
" 21. *Christiania?* Hough. *Kaafiord.* Ihle. Reich.
" 22. *Christiania.* Hansteen.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 28. *Jakobshavn.* Rudolph.
" 29. *Cambridge.* Lovering.
" 30. *New Haven.* Herrick. Newton and Loomis.
Dec. 7. *Nijne-Taguilsk.* Demidoff.
" 11. *Brussels.* Quetelet.
" 12. *Christiania.* Hansteen.
" 13. *New Haven.* Herrick. Newton and Loomis.
" 13. *Jakobshavn.* Rudolph.
" 13. *Christiania.* Hansteen.
" 14. *New York.* Hough. *Nijne-Taguilsk.*
" 16. *Jakobshavn.* Rudolph.
" 17. *New York.* Hough. *Jakobshavn.* Rudolph.
" 17. *New Haven.* Herrick. Newton and Loomis.

[1] L'Institut. Sci. Math. Phys. &c. VIII. 57 and 180.

Dec. 20. *New York.* Hough. *Toronto.* Sabine.
" 20. *Christiania.* Hansteen.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *Newberry.* Johnson. *New York.* Hough.
" 21. *Brussels.* Quetelet.
" 21. *Eutin.* Schmidt.
" 21. *Christiania.* Hansteen.
" 21. *Catharinebourg.*[1] Kupffer.
" 21. *Bogoslowski.* Kupffer.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 23. *Christiania.* Hansteen.
" 24. *New Haven.* Herrick. Newton and Loomis.
" 24. *Christiania.* Hansteen. *Parma.* Colla.
" 25. *New York.* Hough.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *Toronto.* Sabine. *Parma.* Colla.
" 31. *Christiania.* Hansteen.

1841.

Jan. 10. *Zlatoouste?* Kupffer.
" 11. *Zlatoouste.* Kupffer.
" 14. *Cambridge.* Bond. Lovering.
" 14. *New York.* Hough.
" 15. *Christiania.* Hansteen.
" 18. *Toronto.* Sabine.
" 19. *Christiania.* Hansteen.
" 20. *Christiania.* Hansteen.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 24. *Brussels.* Quetelet. *Toronto.* Sabine.
" 24. *Christiania.* Hansteen.
" 25. *New Haven.* Herrick. Newton and Loomis.[2]
" 25. *Toronto.* Sabine. *Christiania.* Hansteen.
" 27. *Cambridge.* Bond. Lovering.[3]
" 27. *Toronto.* Sabine.[4]
" 28. *New Haven.* Herrick. Newton and Loomis.
" 31. *Christiania.* Hansteen.
" *x.* *Eutin.* Schmidt.
Feb. 7. *Cambridge.* Bond. Lovering.
" 7. *New Haven.* Herrick. Newton and Loomis.
" 7. *New York.* Hough.
" 8. *New Haven.* Herrick. Newton and Loomis.
" 8. *New York.* Hough. *Providence.* Caswell.
" 8. *Newberry.* Johnson. *Jakobshavn.* Rudolph.
" 9. *New York.* Hough. *Jakobshavn.* Rudolph.
" 11. *New York.* Hough. *Toronto.* Sabine.

[1] Annuaire Magnet. et Meteor. de Russie, 1840, p. 72, &c.
[2] Bull. de l'Acad. Brux. VIII. Pt. II. p. 64.
[3] From the Meteor. Records of the Harvard College Observatory, not yet published.
[4] Observ. during unusual Magnet. Disturb. Pt. I. p. XXII.

Feb. 12. *New Haven.* Herrick. Newton and Loomis.
" 15. *Worcester.* Woodward. *Newberry.* Johnson.
" 16. *New York.* Hough. *Jakobshavn.* Rudolph.
" 17. *New York.* Hough.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 19. *Washington, D. C.* Gilliss.
" 20. *New York.* Hough.
" 21. *New York.* Hough.
" 22. *Cambridge.* Bond. *Boston.* Hale. Lovering.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 22. *New York.* Hough. *Providence.* Caswell.
" 23. *Cambridge.* Bond. Lovering.
" 23. *Boston.* Hale. Lovering. *Toronto.* Sabine.
" 23. *Newberry.* Johnson. *New York.* Hough.
" 24. *New Haven.* Herrick. Newton and Loomis.
" 24. *New York.* Hough. *Brussels.* Quetelet.
" 25. *New York.* Hough.
" 26. *Jakobshavn.* Rudolph.
Mar. 1. *New York.* Hough.
" 11. *New Haven.* Herrick. Newton and Loomis.
" 11. *New York.* Hough. *Newberry.* Johnson.
" 11. *Jakobshavn.* Rudolph.
" 12. *Cambridge.* Bond. Lovering.
" 14. *Cambridge.* Bond. Lovering.
" 14. *Worcester, Mass.* Woodward.[1]
" 14. *New York.* Hough. *Newberry.* Johnson.
" 14. *Christiania.* Hansteen. *Canada.* Sabine.
" 15. *Cambridge.* Bond. Lovering.
" 15. *New York.* Hough. *Newberry.* Johnson.
" 15. *Worcester.* Woodward. *Christiania.* Hansteen.
" 16. *Cambridge.* Bond. Lovering.
" 16. *New York.* Hough.
" 17. *New York.* Hough. *Newberry.* Johnson.
" 17. *Hobarton, Van Dieman's Land.* Sabine.[2]
" 19. *New Haven.* Herrick. Newton and Loomis.
" 20. *Cambridge.* Bond. Lovering.
" 20. *New York.* Hough.
" 21. *Cambridge.* Bond. Lovering.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 22. *Newberry.* Johnson.
" 22. *Dunse.* Stevenson. *York.* Phillips.[3]
" 22. *Durham.* Chevalier. *Belfast.* Stevelly.[4]
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *New York.* Hough. *Hobarton.* Sabine.
" 24. *Cambridge.* Bond. Lovering.

[1] Med. and Surg. Journ. Boston, XXIV. 83, 148 and 383.
[2] Magnet. and Meteor. Observ. Hobarton, I. 130.
[3] Proc. Brit. Assoc. XVI. 7.
[4] Athenæum, 1841, pp. 266 and 340.

Mar. 24. *New Haven.* Herrick. Newton and Loomis.
" 24. *New York.* Hough. *Providence.* Caswell.
" 24. *Newberry.* Johnson. *Worcester.* Woodward.
" 24. *Philadelphia.* Bache.[1]
" 25. *Cambridge.* Bond. Lovering.
Apr. 7. *Christiania.* Hansteen.
" 8. *Christiania.* Hansteen.
" 11. *Cambridge.* Bond. Lovering.
" 11. *New Haven.* Herrick. Newton and Loomis.
" 11. *New York.* Hough. *Christiania.* Hansteen.
" 14. *Cambridge.* Bond. Lovering.
" 16. *Cambridge.* Bond. Lovering.
" 16. *New Haven.* Herrick. Newton and Loomis.
" 16. *New York.* Hough.
" 18. *Cambridge.* Bond. Lovering.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 18. *New York.* Hough.
" 19. *Cambridge.* Bond. Lovering.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *Providence.* Caswell. *Toronto.* Sabine.
" 20. *New York.* Hough.
" 21. *New York.* Hough.
" 22. *Toronto.* Sabine.
" 25. *New York.* Hough. *Bogoslowski.* Kupffer.[2]
" 27. *Toronto.* Sabine.
May 3. *Cambridge.* Bond. Lovering.
" 7. *New York.* Hough.
" 8. *New Haven.* Herrick. Newton and Loomis.
" 8. *New York.* Hough.
" 9. *New York.* Hough.
" 18. *Hobarton.* Sabine.
" 20. *New York.* Hough.
" 26. *New York.* Hough.
June 11. *New York.* Hough.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *New York.* Hough. *Brussels.* Quetelet.
" 16. *Brussels.* Quetelet.
" 17. *Worcester.* Woodward.
" 21. *Worcester, Mass.* Woodward.
July 6. *New York.* Hough.
" 11. *Cambridge.* Bond. Lovering.
" 18. *New York.* Hough.
" 19. *Cambridge.* Bond. Lovering.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *Worcester.* Woodward.[3] *Washington.* Gilliss.
" 19. *New York.* Hough. *Toronto.* Sabine.

[1] Magnet. and Meteor. Observ. Girard College, I. 266 and 938.
[2] Annuaire Magnet. et Meteor. de Russie, 1841, pp. 373 et 404.
[3] Med. and Surg. Journ. Boston, XXV. 20, 103 and 231.

July 20. *New York.* Hough. *Hobarton.* Sabine.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *New York.* Hough. *Toronto.* Sabine.
" 24. *New York.* Hough.
" 25. *New York.* Hough.
" 28. *Toronto.* Sabine.
" 29. *New York.* Hough. *Worcester.* Woodward.
Aug. 2. *New Haven.* Herrick. Newton and Loomis.[1]
" 3. *New York.* Hough.
" 4. *New York.* Hough.
" 5. *New York.* Hough.
" 6. *Worcester, Mass.* Woodward.
" 6. *New York.* Hough. *Washington, D.C.* Gilliss.
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *Toronto.* Sabine. *Dunse.* Stevenson.
" 7. *New York.* Hough.
" 11. *New York.* Hough.
" 14. *New York.* Hough. *Washington, D.C.* Gilliss.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *Toronto.* Sabine.
" 16. *New York.* Hough.
" 17. *New York.* Hough.
" 22. *New York.* Hough.
" 23. *New York.* Hough. *Toronto.* Sabine.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 24. *Toronto.* Sabine.
" 26. *Christiania.* Hansteen.
" 27. *New York.* Hough. *Christiania.* Hansteen.
Sept. 5. *Gothaab, Greenland.* Block.[2]
" 10. *Gothaab.* Block.
11. *Toronto.* Sabine.
" 12. *New York.* Hough.
" 12. *Michigan.* Nicollet. Newton and Loomis.[3]
12. *Montreal.* Olmsted. Newton and Loomis.
" 13. *New Haven.* Herrick. Newton and Loomis.
" 13. *Christiania.* Hansteen.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *Michigan.* Nicollet. Newton and Loomis.
" 14. *New York.* Hough.
" 15. *Gothaab.* Block.
" 16. *New York.* Hough.
" 17. *Gothaab.* Block.
" 18. *New York.* Hough.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 24. *Christiania.* Hansteen. *Gothaab.* Block.
" 25. *New Haven.* Herrick. Newton and Loomis.

[1] Bull. de l'Acad. Brux. IX. Pt. I. 185.
[2] Collect. Meteor. Soc. Sci. Danicœ. Fasc. IV. p. 167.
[3] Trans. Amer. Phil. Soc. VIII. 323.

Sept. 25. *Washington, D. C.* Gilliss.
" 25. *New York.* Hough. *Toronto.* Sabine.
" 25. *Christiania.* Hansteen. *Dunse.* Stevenson.
" 26. *Cambridge.* Bond. Lovering.
" 26. *New Haven.* Herrick. Newton and Loomis.
Oct. 5. *New York.* Hough.
" 6. *New York.* Hough. *Gothaab.* Block.
" 7. *Toronto.* Sabine. *Gothaab.* Block.
" 8. *New York.* Hough. *Toronto.* Sabine.
" 8. *Jakobshavn.* Rudolph. *Gothaab.* Block.
" 9. *Cambridge.* Bond. Lovering.
" 9. *New Haven.* Herrick. Newton and Loomis.
" 9. *Providence, R. I.* Caswell. *New York.* Hough.
" 9. *Toronto.* Sabine. *Gothaab.* Block.
" 10. *Gothaab.* Block.
" 11. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 12. *Gothaab.* Block.
" 13. *New York.* Hough. *Gothaab.* Block.
" 14. *Cambridge.* Bond. Lovering.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *Worcester.* Herrick. Newton and Loomis.
" 14. *Jakobshavn.* Rudolph. *Gothaab.* Block.
" 15. *Cambridge.* Bond. Lovering.
" 15. *Christiania.* Hansteen. *Gothaab.* Block.
" 16. *Gothaab.* Block.
" 18. *Brussels.* Quetelet. Arago.
" 18. *Geneva.* Wartmann. *Christiania.* Hansteen.
" 19. *Gothaab.* Block.
" 20. *New Haven.* Herrick. Newton and Loomis.
" 20. *Gothaab.* Block.
" 21. *Cambridge.* Bond. Lovering. *Gothaab.* Block.
" 24. *Toronto.* Sabine.
" 25. *New Haven.* Herrick. Newton and Loomis.
" 28. *Christiania.* Hansteen.
" 29. *Christiania.* Hansteen.
Nov. 1. *New York.* Hough. *Canada.* Hough.
" 1. *Gothaab.* Block.
" 2. *Gothaab.* Block.
" 3. *Gothaab.* Block.
" 5. *New Haven?* Herrick. Newton and Loomis.
" 5. *New York.* Hough. *Gothaab.* Block.
" 6. *Christiania.* Hansteen. *Gothaab.* Block.
" 7. *Christiania.* Hansteen. *Gothaab.* Block.
" 7. *Jakobshavn.* Rudolph.
" 8. *New Haven.* Herrick. Newton and Loomis.
" 8. *Toronto.* Sabine. *Christiania.* Hansteen.
" 8. *Gothaab.* Block.
" 9. *Gothaab.* Block.
" 10. *New York.* Hough. *Christiania.* Hansteen.
" 11. *Christiania.* Hansteen. *Gothaab.* Block.

Nov. 12. *Paris.* Laugier. Arago. *Gothaab.* Block.
" 12. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.
" 13. *Christiania.* Hansteen. *Gothaab.* Block.
" 14. *Christiania.* Hansteen. *Gothaab.* Block.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *Jakobshavn.* Rudolph. *Gothaab.* Block.
" 17. *New York.* Hough. *Christiania.* Hansteen.
" 17. *Jakobshavn.* Rudolph. *Gothaab.* Block.
" 18. *Cambridge.* Lovering. *Providence.* Caswell.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 18. *New York.* Hough. *Toronto.* Sabine.
" 18. *Brussels.* Quetelet. *Gothaab.* Block.
" 18. *Christiania.* Hansteen. *Dunse.* Stevenson.
" 19. *Christiania.* Hansteen. *Dunse.* Stevenson.
" 19. *Jakobshavn.* Rudolph.
" 20. *Gothaab.* Block.
" 21. *Gothaab.* Block.
" 23. *Gothaab.* Block.
" 28. *Gothaab.* Block.
Dec. 1. *Gothaab.* Block.
" 2. *Gothaab.* Block.
" 3. *Christiania.* Hansteen. *Gothaab.* Block.
" 3. *Jakobshavn.* Rudolph.
" 4. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 5. *Gothaab.* Block.
" 6. *Gothaab.* Block.
" 7. *Gothaab.* Block.
" 8. *Bogoslowski.* Kupffer. *Gothaab.* Block.
" 9. *Christiania.* Hansteen. *Gothaab.* Block.
" 10. *Gothaab.* Block.
" 11. *Gothaab.* Block.
" 12. *Paris.* Boué.[1] *Gothaab.* Block.
" 13. *Paris.* Boué. *Gothaab.* Block.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *New York.* Hough. *Gothaab.* Block.
" 14. *Christiania.* Hansteen. *Dunse.* Stevenson.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *Gothaab.* Block.
" 16. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 17. *Toronto.* Sabine. *Dunse.* Stevenson.
" 17. *Hobarton, V. D. Land.* Sabine.[2]
" 17. *Gothaab.* Block.
" 18. *Gothaab.* Block.
" 19. *Cambridge.* Bond. Lovering.
" 19. *Cracow.* Weisse. *Christiania.* Hansten.
" 19. *Gothaab.* Block.
" 20. *Cracow.* Weisse.[3]

[1] Ec... du Monde Savant, 1841, p. 728.
[2] Aurora Australis. [3] Bull. de l'Acad. Brux. IX. Pt. I. p. 14.

Dec. 21. *Cambridge.* Bond. Lovering.
" 24. *Cambridge.* Lovering.
" 24. *New Haven?* Herrick. Newton and Loomis.
" 27. *Gothaab.* Block.
" 30. *Gothaab.* Block.
" 31. *Gothaab.* Block.

1842.

Jan. 1. *Hobarton.* Sabine.[1] *Jakobshavn.* Rudolph.
" 2. *Gothaab.* Block.
" 2. *Worcester, Mass.* Woodward.[2]
" 3. *Gothaab.* Block.
" 4. *Cambridge.* Lovering.
" 5. *Cambridge.* Lovering.
" 6. *Christiania.* Hansteen. *Gothaab.* Block.
" 6. *Jakobshavn.* Rudolph.
" 7. *Cambridge.* Lovering.
" 8. *St. Louis.* Herrick. Newton and Loomis.
" 8. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 9. *Cambridge.* Lovering. *Gothaab.* Block.
" 9. *New Haven?* Herrick. Newton and Loomis.
" 11. *Cambridge.* Bond. Lovering.
" 11. *New York.* Hough. *Newberry.* Johnson.
" 11. *Toronto.* Sabine. *Gothaab.* Block.
" 12. *Cambridge.* Bond. Lovering.
" 12. *Gothaab.* Block.
" 13. *Gothaab.* Block.
" 14. *Gothaab.* Block.
" 15. *Cambridge.* Lovering. *Worcester.* Woodward.
" 15. *Washington, D. C.* Gilliss.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *New York.* Hough. *Canada.*
" 15. *Newberry.* Johnson. *Providence.* Caswell.
" 15. *Christiania.* Hansteen. *Gothaab.* Block.
" 16. *Gothaab.* Block.
" 17. *Gothaab.* Block.
" 18. *Gothaab.* Block.
" 20. *New Haven?* Herrick. Newton and Loomis.
" 20. *Gothaab.* Block.
" 24. *St. Petersburg.* Kupffer.
" 31. *Gothaab.* Block.
Feb. 1. *New York.* Hough.
" 1. *Hobarton.* Sabine.[1] *Gothaab.* Block.
" 2. *Worcester.* Woodward. *Gothaab.* Block.
" 3. *Gothaab.* Block.
" 4. *Gothaab.* Block.

[1] Aurora Australis.
[2] Med. and Surg. Journ. Boston, XXVI. 36, 83, 228 and 391.

Feb. 6. *New Haven?* Herrick. Newton and Loomis.[1]
" 6. *Washington, D. C.* Gilliss.
" 7. *Gothaab.* Block.
" 8. *Christiania.* Hansteen. *Gothaab.* Block.
" 9. *Gothaab.* Block.
" 10. *Gothaab.* Block.
" 11. *Cambridge.* Lovering. *Worcester.* Woodward.
" 11. *New Haven.* Herrick. Newton and Loomis.
" 11. *Dunse.* Stevenson.
" 12. *New York.* Hough.
" 13. *New York.* Hough. *Gothaab.* Block.
" 14. *Christiania.* Hansteen. *Gothaab.* Block.
" 16. *Christiania.* Hansteen. *Gothaab.* Block.
" 17. *Gothaab.* Block.
" 18. *Christiania.* Hansteen. *Hobarton.* Sabine.
" 18. *Gothaab.* Block.
" 19. *Gothaab.* Block.
" 24. *Worcester, Mass.* Woodward.
" 24. *Christiania.* Hansteen. *Gothaab.* Block.
" 24. *St. Petersburg.* Kupffer.[2]
" 24. *Alford.* Farquharson.[3]
" 26. *Gothaab.* Block.
" 27. *Gothaab.* Block.
" 28. *Gothaab.* Block.
Mar. 1. *Christiania.* Hansteen.
" 2. *Gothaab.* Block.
" 3. *Sitka.* Kupffer. *Gothaab.* Block.
" 3. *St. Petersburg.* Kupffer.
" 4. *Gothaab.* Block.
" 5. *Christiania.* Hansteen. *Gothaab.* Block.
" 6. *Sitka.* Kupffer.
" 7. *New Haven?* Herrick. Newton and Loomis.
" 10. *Toronto.* Sabine.
" 11. *Toronto.* Sabine.
" 12. *New York.* Hough.
" 15. *St. Petersburg.* Kupffer.
" 16. *Christiania.* Hansteen.
" 17. *Gothaab.* Block.
" 19. *Sitka.* Kupffer.
" 20. *New York.* Hough. *Sitka.* Kupffer.
" 23. *Cambridge.* Bond. Lovering.
" 27. *Gothaab.* Block.
" 28. *Gothaab.* Block.
" 29. *Christiania.* Hansteen.
" 30. *Christiania.* Hansteen.
Apr. 1. *Christiania.* Hansteen.

[1] Bull. de l' Acad. Brux. IX. Pt. II. p. 145.
[2] Annuare. Magnet. et Meteor. de Russie. 1842, p. 41.
[3] Phil. Trans. 1842, p. 87. Edin. New Phil. Journ. XXXVIII. 135.

Apr. 3. *St. Petersburg.* Kupffer. *Gothaab.* Block.
" 3. *Christiania.* Hansteen.
" 4. *Gothaab.* Block.
" 5. *New York.* Hough. *Christiania.* Hansteen.
" 6. *Gothaab.* Block.
" 7. *Christiania.* Hansteen. *Gothaab.* Block.
" 8. *Christiania.* Hansteen. *Gothaab.* Block.
" 9. *Christiania.* Hansteen. *Gothaab.* Block.
" 10. *Cambridge.* Bond. Lovering.
" 10. *Worcester, Mass.* Woodward.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 10. *New York.* Hough. *Christiania.* Hansteen.
" 10. *Gothaab.* Block.
" 11. *New Haven.* Herrick. Newton and Loomis.
" 11. *New York.* Hough. *Toronto.* Sabine.
" 11. *Christiania.* Hansteen. *Sitka.* Kupffer.
" 11. *Hobarton, V.D.Land.* Sabine.[1] *Gothaab.* Block.
" 12. *Cambridge.* Bond. Lovering.
" 12. *New York.* Hough. *Christiania.* Hansteen.
" 13. *Worcester, Mass.* Woodward.
" 13. *Christiania.* Hansteen. *Hobarton.*[1] Sabine.
" 14. *Worcester.* Woodward. *Washington.* Gilliss.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *New York.* Hough. *Toronto.* Sabine.[2]
" 14. *Christiania.* Hansteen. *Hobarton.* Sabine.[1]
" 15. *New York.* Hough. *Toronto.* Sabine.
" 15. *Philadelphia.* Bache.
" 15. *Christiania.* Hansteen. *Hobarton.* Sabine.
" 15. *St. Petersburg.* Kupffer.
" 16. *Worcester, Mass.* Woodward.
" 16. *Christiania.* Hansteen. *Toronto.* Sabine.
" 20. *New Haven.* Herrick. Newton and Loomis.[3]
" 26. *Gothaab.* Block.
" 29. *Christiania.* Hansteen.
May 16. *Hobarton, Van Dieman's Land.* Sabine.[1]
June 2. *New York.* Hough.
" 4. *New York.* Hough. *Toronto.* Sabine.
" 7. *Worcester, Mass.* Woodward.
" 9. *Worcester, Mass.* Woodward.
" 13. *New York.* Hough. *Hobarton.* Sabine.
" 30. *Brussels.* Quetelet.
" 31? *Brussels.*[4]
July 2. *New York.* Hough. *Hobarton.* Sabine.
" 3. *Cambridge.* Bond. Lovering.
" 3. *New York.* Hough. *Toronto.* Sabine.

[1] Aurora Australis.
[2] Magnet. and Meteor. Observ. Toronto, II. 172.
[3] Amer. Journ. Sci. XLIII. 213.
[4] Bull. de l'Acad. Brux. IX. Pt. II. p. 6.

July 3. *Brussels.* Quetelet.
" 6. *New York.* Hough.
" 9. *New York.* Hough.
" 11. *New Haven.* Herrick. Newton and Loomis.
" 12. *Toronto.* Sabine.
" 13. *New York.* Hough.
" 20. *Sitka.* Kupffer.
" 31. *New York.* Hough. *Canada.* Hough.
Aug. 5. *New York.* Hough. *Canada.* Hough.
" 7. *Christiania.* Hansteen.
" 9. *Cambridge.* Lovering.
" 9. *Christiania.* Hansteen.
" 10. *Christiania.* Hansteen.
" 14. *Christiania.* Hansteen.
" 23. *New Haven.* Herrick. Newton and Loomis.[1]
" 24. *Gothaab.* Block.
Sept. 2. *New Haven.* Herrick. Newton and Loomis.
" 2. *New York.* Hough. *Toronto.* Sabine.
" 2. *Philadelpha.* Bache.
" 2. *Christiania.* Hansteen. *Sitka.* Kupffer.
" 2. *Hobarton.* Sabine. *Gothaab.* Block.
" 3. *Gothaab.* Block.
" 4. *Gothaab.* Block.
" 5. *Gothaab.* Block.
" 8. *Gothaab.* Block.
" 9. *Gothaab.* Block.
" 10. *Gothaab.* Block.
" 11. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 12. *Jakobshavn.* Rudolph.
" 13. *Gothaab.* Block.
" 14. *Gothaab.* Block.
" 15. *Gothaab.* Block.
" 18. *Gothaab.* Block.
" 19. *New York.* Hough. *Gothaab.* Block.
" 20. *Christiania.* Hansteen.
" 23. *Jakobshavn.* Rudolph.
" 25. *Jakobshavn.* Rudolph.
" 28. *Cambridge.* Bond. Lovering.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *Christiania.* Hansteen.
" 29. *New York.* Hough.
" 30. *Christiania.* Hansteen. *Gothaab.* Block.
Oct. 2. *Gothaab.* Block.
" 3. *Jakobshavn.* Rudolph.
" 7. *France.* Marcel.[2] Hough.
" 7. *Christiania.* Hansteen.
" 8. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.

[1] Bull. de l'Acad. Brux. X. Pt. II. p. 111.
[2] L'Institut. Sci. Math. Phys. &c. X. 443.

Oct. 9. *Gothaab.* Block.
" 13. *New York.* Hough.
" 15. *Christiania.* Hansteen.
" 16. *Parma.* Colla.
" 17. *Geneva.* Wartmann.[1]
" 18. *Brussels.* Quetelet.
" 23. *Gothaab.* Block.
" 27. *Christiania.* Hansteen.
" 28. *Christiania.* Hansteen.
" 29. *New York.* Hough.
" 29. *Christiania.* Hansteen. *Gothaab.* Block.
" 30. *Christiania.* Hansteen. *Gothaab.* Block.
" 31. *Gothaab.* Block.
Nov. 1. *Gothaab.* Block.
" 2. *Gothaab.* Block.
" 3. *New Haven?* Herrick. Newton and Loomis.
" 3. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.
" 4. *Christiania.* Hansteen.
" 6. *New Haven?* Herrick. Newton and Loomis.
" 7. *Jakobshavn.* Rudolph.
" 8. *Gothaab.* Block.
" 9. *New York.* Hough. *Jakobshavn.* Rudolph.
" 10. *Christiania.* Hansteen. *Gothaab.* Block.
" 10. *Jakobshavn.* Rudolph.
" 11. *Sitka.* Kupffer. *Jakobshavn.* Rudolph.
" 12. *Gothaab.* Block.
" 13. *Gothaab.* Block.
" 14. *Gothaab.* Block.
" 21. *Worcester, Mass.* Woodward.[2]
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *Philadelphia.* Bache.
" 21. *New York.* Hough. *Newberry.* Johnson.
" 21. *Christiania.* Hansteen.
" 22. *Gothaab.* Block.
" 23. *Gothaab.* Block.
" 24. *New York.* Hough. *Paris.* Bouvard. Arago.[3]
" 24. *Gothaab.* Block.
" 25. *Gothaab.* Block.
" 27. *New York.* Hough.
" 28. *Cambridge.* Bond. Lovering.
Dec. 1. *Gothaab.* Block.
" 2. *Gothaab.* Block.
" 5. *Christiania.* Hansteen.
" 5. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 6. *Christiania.* Hansteen. *Toronto.* Sabine.
" 6. *Gothaab.* Block.
" 7. *Gothaab.* Block.

[1] L'Institut. Sci. Math. Phys. &c. X. 443.
[2] Med. and Surg. Journ. XXVII. 324.
[3] L'Institut. X. 443. Connaiss. de Tems. 1846, p. 412.

Dec. 8. *Gothaab.* Block.
" 9. *Christiania.* Hansteen.
" 14. *Gothaab.* Block.
" 17. *New York.* Hough.
" 18. *Gothaab.* Block.
" 19. *New York.* Hough.
" 20. *Gothaab.* Block.
" 21. *Jakobshavn.* Rudolph.
" 22. *Gothaab.* Block.
" 27. *Cambridge.* Bond. Lovering.
" 27. *Christiania.* Hansteen.
" 28. *Christiania.* Hansteen. *Gothaab.* Block.
" 29. *Gothaab.* Block.
" 31. *Hobarton, Van Dieman's Land.* Sabine.

1843.

Jan. 2. *Hamburg.* Schmidt. *Christiania.* Hansteen.
" 2. *Jakobshavn.* Rudolph.
" 5. *Christiania.* Hansteen.
" 6. *Gothaab.* Block.
" 8. *Gothaab.* Block.
" 10. *New York.* Hough.
" 12. *Scotland.* Hough.
" 13. *Gothaab.* Block.
" 17. *Gothaab.* Block.
" 20. *Gothaab.* Block.
" 21. *Gothaab.* Block.
" 22. *Christiania.* Hansteen.
" 23. *Gothaab.* Block.
" 24. *New York.* Hough. *Gothaab.* Block.
" 25. *Gothaab.* Block.
" 27. *Christiania.* Hansteen.
" 28. *Christiania.* Hansteen. *Gothaab.* Block.
" 28. *Edinburgh. Makerstoun.* Broun.[1]
" 28. *Jakobshavn.* Rudolph.
" 29. *New York.* Hough.
" 29. *Christiania.* Hansteen. *Gothaab.* Block.
" 30. *Gothaab.* Block.
" 31. *New York.* Hough.
Feb. 3. *New York.* Hough.
" 4. *New York.* Hough.
" 6. *Christiania.* Hansteen.
" 13. *New York.* Hough.
" 14. *Gothaab.* Block.
" 15. *Gothaab.* Block.
" 17. *Christiania.* Hansteen.
" 18. *New York.* Hough. *Gothaab.* Block.

[1] Edin. Phil. Trans. XIX. Pt. 2. The time of these observations has been reduced from Gottingen Astron. time to the mean civil time of the place.

Feb. 19. *Christiania.* Hansteen. *Gothaab.* Block.
" 20. *Christiania.* Hansteen. *Gothaab.* Block.
" 20. *Jakobshavn.* Rudolph.
" 21. *Gothaab.* Block.
" 22. *Christiania.* Hansteen. *Gothaab.* Block.
" 23. *New York.* Hough. *Christiania.* Hansteen.
" 23. *Gothaab.* Block.
" 24. *Philadelphia.* Bache.[1]
" 24. *New York.* Hough. *Christiania.* Hansteen.
" 24. *Makerstoun.* Broun. *Jakobshavn.* Rudolph.
" 25. *New York.* Hough. *Christiania.* Hansteen.
" 25. *Gothaab.* Block.
" 26. *New York.* Hough.
" 28. *Gothaab.* Block.
Mar. 2. *Hamburg.* Schmidt.
" 3. *Gothaab.* Block.
" 4. *New York.* Hough. *Newberry.* Johnson.
" 4. *Christiania.* Hansteen. *Gothaab.* Block.
" 5. *New York.* Hough. *Christiania.* Hansteen.
" 5. *Gothaab.* Block.
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *New York.* Hough. *Providence.* Caswell.
" 6. *Toronto.* Sabine. *Christiania.* Hansteen.
" 6. *Gothaab.* Block.
" 7. *New York.* Hough. *Christiania.* Hansteen.
" 7. *Makerstoun.* Broun.
" 11. *Jakobshavn.* Rudolph.
" 12. *Holland.* Hough. *Makerstoun.* Broun.
" 12. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 13. *Parma.* Colla. *Gothaab.* Block.
" 17. *New Haven.* Herrick. Newton and Loomis.
" 17. *Gothaab.* Block.
" 18. *New York.* Hough. *Christiania.* Hansteen.
" 18. *Gothaab.* Block.
" 19. *Christiania.* Hansteen.
" 20. *Christiania.* Hansteen. *Gothaab.* Block.
" 21. *Christiania.* Hansteen. *Gothaab.* Block.
" 22. *Christiania.* Hansteen. *Gothaab.* Block.
" 22. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 25. *Gothaab.* Block.
" 27. *Gothaab.* Block.
" 29. *Newberry.* Johnson.
" 29. *Christiania.* Hansteen. *Gothaab.* Block.
" 29. *Makerstoun.* Broun. *Dunse.* Stevenson.
" 30. *Christiania.* Hansteen. *Gothaab.* Block.
Apr. 2. *New Haven.* Herrick. Newton and Loomis.
" 2. *New York.* Hough.
" 3. *Gothaab.* Block.

[1] Magnet. and Meteor. Observ. Girard College, II. 1248.

Apr. 4. *New York.* Hough.
" 5. *New York.* Hough. *Toronto.* Sabine.
" 5. *Brussels.* Quetelet. *Hamburg.* Schmidt.
" 5. *Makerstoun.* Broun. *Edinburgh.*
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *New York.* Hough. *Providence.* Caswell.
" 6. *Toronto.* Sabine. *Brussels.* Quetelet.
" 6. *Gothaab.* Block.
" 7. *Makerstoun.* Broun.
" 11. *New York.* Hough.
" 14. *Gothaab?* Block.
" 15. *New York.* Hough.
" 17. *Christiania.* Hansteen. *Gothaab.* Block.
" 19. *New York.* Hough.
" 22. *New York.* Hough.
" 23. *Edinburgh.*[1]
" 25. *Dunse.* Stevenson.
May 6. *Brussels.* Quetelet. *Greenwich.* Airy.[2]
" 6. *Collingwood.* Herschel. *France.* Arago.[3]
" 7. *New York.* Hough. *Philadelphia.* Bache.
" 9. *Brussels.* Quetelet.
" 13. *New York.* Herrick. Newton and Loomis.
" 17. *Litchfield, Conn.* Herrick. Newton and L.
" 23. *Goshen, Conn.* Herrick. *New Haven.* Bradlee.
" 25. *New York.* Hough.
" 29. *New York.* Hough.
June 3. *New York.* Hough.
" 8. *New York.* Hough.
" 13. *New York.* Hough.
" 15. *New York.* Hough.
" 22. *New York.* Hough.
" 27. *Philadelphia.* Bache.
" 29. *New York.* Hough.
" 30. *New Haven.* Herrick. Newton and Loomis.[4]
" 30. *Philadelphia.* Bache.
" 30. *New York.* Hough. *Toronto.* Sabine.
July 1. *New York.* Hough.
" 2. *New York.* Hough. *Toronto.* Sabine.
" 4. *New York.* Hough. *Toronto.* Sabine.
" 7. *Philadelphia.* Bache.
" 19. *New York.* Hough.
" 25. *New Haven.* Herrick. Newton and Loomis.
" 25. *New York.* Hough. *Newberry.* Johnson.
" 25. *Philadelphia.* Bache. *Toronto.* Sabine.
" 30. *New York.* Hough.

[1] Edin. Phil. Journ. 1844, p. 378.
[2] Greenwich Magnet. and Meteor. Observ. 1843, p. 251.
[3] Compt. Rend. XVI. 1092. Athenæum, 1843, p. 465.
[4] Bull. de l'Acad. Brux. XII. Pt. I. 532.

July 31. *New York.* Hough.
Aug. 3. *Cambridge.* Bond. Lovering.
" 3. *New York.* Hough. *Toronto.* Sabine.
" 3. *Hamburg.* Schmidt.
" 12. *New York.* Hough.
" 22. *New York.* Hough. *Edinburgh.* Paul.[1]
" 26. *Gothaab.* Block.
Sept. 1. *Christiania.* Hansteen. *Gothaab.* Block.
" 2. *Christiania.* Hansteen. *Gothaab.* Block.
" 9. *New York.* Hough.
" 10. *Gothaab.* Block.
" 13. *New Haven.* Herrick. Newton and Loomis.
" 14. *Gothaab.* Block.
" 15. *Gothaab.* Block.
" 18. *New Haven.* Bradley. Newton and Loomis.
" 18. *New York.* Hough. *Toronto.* Sabine.
" 18. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 19. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 20. *New York.* Hough.
" 21. *Christiania.* Hansteen. *Gothaab.* Block.
" 21. *Makerstoun.* Broun.
" 22. *Christiania.* Hansteen. *Gothaab.* Block.
" 22. *Jakobshavn.* Rudolph.
" 24. *Gothaab.* Block.
" 25. *Gothaab.* Block.
" 26. *Christiania.* Hansteen.
" 27. *Cambridge.* Bond. Lovering.
" 27. *New Haven.* Herrick. Newton and Loomis.
" 27. *New York.* Hough. *Providence.* Caswell.
" 28. *Cambridge.* Bond. Lovering.
" 28. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 29. *New York.* Hough. *Toronto.* Sabine.
" 30. *New York.* Hough. *Newberry.* Johnson.
" 30. *Gothaab.* Block.
Oct. 2. *Jakobshavn.* Rudolph.
" 5. *New York.* Hough.
" 9. *New York.* Hough.
" 14. *Cambridge.* Bond. Lovering.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *Christiania.* Hansteen.
" 15. *Lake Athabasca.* Lefroy.[2]
" 15. *Makerstoun.* Broun. *Christiania.* Hansteen.
" 16. *Lake Athabasca.* Lefroy.
" 16. *Makerstoun.* Broun.
" 18. *Jakobshavn.* Rudolph.
" 19. *New York.* Hough.

[1] Edin. Phil. Journ. 1844, p. 378.
[2] Magnet. and Meteor. Observ. at Lake Athabasca, &c. p. 147.

Oct. 19. *Toronto and Lake Athabasca.* Lefroy.
" 20. *New York.* Hough.
" 20. *Lake Athabasca.* Lefroy.
" 21. *New York.* Hough.
" 24. *Christiania.* Hansteen. *Gothaab.* Block.
" 25. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
" 26. *Christiania.* Hansteen.
" 26. *Lake Athabasca.* Lefroy.
" 26. *Makerstoun.* Broun. *Gothaab.* Block.
" 28. *Lake Athabasca.* Lefroy.
" 31. *Lake Athabasca.* Lefroy.
" 31. *Jakobshavn.* Rudolph.
Nov. 1. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
" 2. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
" 2. *Makerstoun.* Broun.
" 4. *Gothaab.* Block.
" 8. *Gothaab.* Block.
" 9. *Lake Athabasca.* Lefroy.
" 10. *Gothaab.* Block.
" 13. *Lake Athabasca.* Lefroy.
" 13. *Makerstoun.* Broun.
" 14. *Makerstoun.* Broun. *Gothaab.* Block.
" 15. *Cambridge.* Bond. Lovering.
" 15. *Gothaab.* Block.
" 16. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 17. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
" 18. *Gothaab.* Block.
" 20. *Gothaab.* Block.
" 21. *Gothaab.* Block.
" 22. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
" 23. *Gothaab.* Block.
" 24. *Gothaab.* Block.
" 25. *Gothaab.* Block.
" 26. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 27. *New Haven?* Herrick. Newton and Loomis.
" 27. *Lake Athabasca.* Lefroy.
" 28. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
" 29. *Lake Athabasca.* Lefroy.
Dec. 6? *Edinburgh.* Paul.[1]
" 8. *Parma.* Colla. Arago.[2]
" 9. *Lake Athabasca.* Lefroy.
" 9. *Christiania.* Hansteen.
" 11. *Toronto.* Sabine. *Makerstoun.* Broun.
" 11. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 12. *New Haven.* Herrick. Newton and Loomis.
" 12. *Makerstoun.* Broun. *Jakobshavn.* Rudolph.
" 13. *Lake Athabasca.* Lefroy.

[1] Edin. Phil. Journ. 1844, p. 378.
[2] L'Institut. Sci. Math. Phys. &c. XII. 9.

Dec. 15. *Lake Athabasca.* Lefroy.
" 17. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 21. *Gothaab.* Block.
" 22. *Lake Athabasca.* Lefroy.
" 22. *Jakobshavn.* Rudolph.
" 24. *Gothaab.* Block.
" 26. *Lake Athabasca.* Lefroy.
" 27. *Makerstoun.* Broun. *Gothaab.* Block.
" 28. *Gothaab.* Block.
" 29. *Paris.* Coulvier-Gravier. Arago.
" 29. *Gothaab.* Block.
" 30. *Gothaab.* Block.
" 31. *Gothaab.* Block.

1844.

Jan. 2. *Gothaab.* Block.
" 3. *Gothaab.* Block.
" 5. *Makerstoun.* Broun.
" 7. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 8. *New Haven?* Herrick. Newton and Loomis.
" 8. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
" 8. *Christiania.* Hansteen.
" 9. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
" 9. *Jakobshavn.* Rudolph.
" 10. *Makerstoun.* Broun. *Gothaab.* Block.
" 11. *Gothaab.* Block.
" 12. *Hamburg.* Schmidt.
" 13. *New Haven.* Herrick. Newton and Loomis.
" 13. *Hamburg.* Schmidt.
" 15. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
" 16. *Lake Athabasca.* Lefroy.
" 16. *Christiania.* Hansteen.
" 17. *Lake Athabasca.* Lefroy.
" 17. *Jakobshavn.* Rudolph.
" 18. *Lake Athabasca.* Lefroy.
" 19. *Hamburg.* Schmidt. *Lake Athabasca.* Lefroy.
" 21. *Lake Athabasca.* Lefroy.
" 22. *Lake Athabasca.* Lefroy.
" 22. *Christiania.* Hansteen.
" 23. *Gothaab.* Block.
" 24. *New Haven.* Herrick. Newton and Loomis.
" 24. *Philadelphia.* Bache.[1]
" 24. *New York.* Hough. *Toronto.* Hough.
" 24. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
" 25. *Gothaab.* Block.
" 26. *Lake Athabasca.* Lefroy.
" 27 *New Haven?* Herrick. Newton and Loomis
" 28. *Lake Athabasca.* Lefroy.
" 30. *Lake Athabasca.* Lefroy.

[1] Magnet. and Meteor. Observ. Girard College. III. 2204.

Jan. 31. *Lake Athabasca.* Lefroy.
Feb. 4. *New York.* Hough.
" 5. *Lake Athabasca.* Lefroy.
" 6. *Gothaab.* Block.
" 7. *Lake Athabasca.* Lefroy.
" 7. *Makerstoun.* Broun.
" 9. *Jakobshavn.* Rudolph.
" 11. *New Haven?* Herrick. Newton and Loomis.
" 11. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
" 12. *Lake Athabasca.* Lefroy.
" 12. *Makerstoun.* Broun.
" 13. *Lake Athabasca.* Lefroy.
" 15. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
" 16. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
" 17. *Lake Athabasca.* Lefroy.
" 17. *Jakobshavn.* Rudolph.
" 17. *Christiania.* Hansteen. *Gothaab.* Block.
" 20. *Hamburg.* Schmidt. *Lake Athabasca.* Lefroy.
" 21. *Lake Athabasca.* Lefroy.
" 22. *Makerstoun.* Broun. *Gothaab.* Block.
" 23. *Gothaab.* Block.
" 26. *Lake Athabasca.* Lefroy.
" 28. *Lake Athabasca.* Lefroy. *Gothaab.* Block.
Mar. 2. *Makerstoun.* Broun. *Toronto.* Sabine.
" 4. *New Haven?* Herrick. Newton and Loomis.
" 7. *New York.* Hough. *Toronto.* Sabine.[1]
" 7. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 8. *New York.* Hough. *Gothaab.* Block.
" 9. *New York.* Hough. *Makerstoun.* Broun.
" 9. *Jakobshavn.* Rudolph.
" 10. *Gothaab.* Block.
" 11. *Gothaab.* Block.
" 12. *Makerstoun.* Broun. *Gothaab.* Block.
" 13. *Gothaab.* Block.
" 16. *Gothaab.* Block.
" 17. *Christiania.* Hansteen. *Gothaab.* Block.
" 19. *Christiania.* Hansteen.
" 20. *Christiania.* Hansteen. *Gothaab.* Block.
" 21. *Christiania.* Hansteen.
" 23. *New York.* Hough. *Gothaab.* Block.
" 24. *New York.* Hough.
" 29. *Newberry.* Johnson. *Makerstoun.* Broun.
" 31. *Christiania.* Hansteen.
Apr. 1. *Fort Simpson.* Lefroy.[2]
" 2. *Fort Simpson.* Lefroy.
" 3. *Fort Simpson.* Lefroy. *Gothaab.* Block.
" 5. *Cambridge.* Bond. Lovering.
Apr. 5. *New Haven.* Herrick. Newton and Loomis.
" 5. *New York.* Hough. *Fort Simpson.* Lefroy.
" 5. *Makerstoun.* Broun. *Gothaab.* Block.
" 6. *Fort Simpson.* Lefroy. *Gothaab.* Block.
" 7. *Fort Simpson.* Lefroy. *Gothaab.* Block.
" 9. *Fort Simpson.* Lefroy.
" 10. *Fort Simpson.* Lefroy. *Makerstoun.* Broun.
" 11. *Fort Simpson.* Lefroy.
" 13. *Fort Simpson.* Lefroy.
" 14. *Fort Simpson.* Lefroy.
" 15. *Fort Simpson.* Lefroy.
" 16. *Fort Simpson.* Lefroy. *Toronto.* Sabine.
" 16. *Hobarton, Van Dieman's Land.* Sabine.
" 17. *Cambridge.* Bond. Lovering.
" 17. *Philadelphia.* Bache.
" 17. *New York.* Hough. *Fort Simpson.* Lefroy.
" 17. *Hamburg.* Schmidt. *Makerstoun.* Broun.
" 17. *Christiania.* Hansteen.
" 18. *Fort Simpson.* Lefroy.
" 19. *New York.* Hough. *Fort Simpson.* Lefroy.
" 19. *Gothaab.* Block.
" 20. *Fort Simpson.* Lefroy.
" 21. *Fort Simpson.* Lefroy. *Hobarton.* Sabine.[1]
" 25. *Fort Simpson.* Lefroy.
" 28. *Fort Simpson.* Lefroy.
May 2. *Fort Simpson.* Lefroy.
" 4. *New York.* Hough. *Fort Simpson.* Lefroy.
" 5. *New York.* Hough. *Fort Simpson.* Lefroy.
" 7. *Toronto.* Sabine.
" 8. *Cambridge.* Bond. Lovering.
" 8. *New York.* Hough. *Toronto.* Sabine.
" 8. *Makerstoun.* Broun.
" 14. *New York.* Hough. *Toronto.* Sabine.
" 21. *Makerstoun.* Broun.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 22. *New York.* Hough. *Toronto.* Sabine.
" 22. *Makerstoun.* Broun.
" 25. *Hobarton, Van Dieman's Land.* Sabine.
June 12. *Providence, R. I.* Caswell.
" 16. *New York.* Hough.
" 22. *New Haven?* Herrick. Newton and Loomis.
July 8. *New York.* Hough.
Aug. 1. *New York.* Hough.
" 1. *Christiania.* Hansteen. *England.* Hough.
" 3. *Makerstoun.* Broun.
" 9. *Nantucket.* Mitchell. Herrick.[2]
" 9. *Toronto.* Sabine. *Makerstoun.* Broun.

[1] Magnet. and Meteor. Observ. Toronto, II. 336.
[2] Magnet. and Meteor. Observ. at LakeA thabasca, &c. p. 179.

[1] Magnet. and Meteor. Observ. Hobarton, II. p. 326.
[2] Bull. de l'Acad. Brux. xii. Pt. I. p. 534.

Aug. 9. *Hamburg.* Schmidt. *England.* Hough.
" 11. *New Haven* Herrick. Newton and Loomis.
" 22. *Gothaab.* Block.
" 23. *Gothaab.* Block.
" 25. *Gothaab.* Block.
" 29. *Cambridge.* Bond. Lovering.
" 29. *Cambridge.* Herrick. Newton and Loomis.
" 29. *Homer, N. Y.* Herrick. Newton and Loomis.
" 29. *Toronto.* Sabine. *Christiania.* Hansteen.
Sept. 2. *Gothaab.* Block.
" 3. *Gothaab.* Block.
" 4. *New York.* Hough. *Gothaab.* Block.
" 7. *Gothaab.* Block.
" 8. *Christiania.* Hansteen. *Gothaab.* Block.
" 9. *Gothaab.* Block.
" 10. *Gothaab.* Block.
" 13. *Gothaab.* Block.
" 14. *New York.* Hough. *Toronto.* Sabine.
" 14. *Gothaab.* Block.
" 15. *New York.* Hough.
" 17. *Newberry.* Johnson. *Gothaab.* Block.
" 18. *Gothaab.* Block.
" 19. *New York.* Hough. *Christiania.* Hansteen.
" 20. *Christiania.* Hansteen.
" 27. *Gothaab.* Block.
" 30. *New Haven?* Herrick. Newton and Loomis.
" 30. *Toronto.* Sabine.
Oct. 1. *Christiania.* Hansteen. *Gothaab.* Block.
" 2. *Makerstoun.* Broun. *Gothaab.* Block.
" 4. *Christiania.* Hansteen. *Gothaab.* Block.
" 5. *Makerstoun.* Broun.
" 6. *Gothaab.* Block.
" 7. *Makerstoun.* Broun.
" 9. *Gothaab.* Block.
" 10. *Gothaab.* Block.
" 19. *Gothaab.* Block.
" 20. *Cambridge.* Bond. Lovering. *Toronto.* Sabine.
" 20. *New Haven.* Herrick. Newton and Loomis.
" 20. *New York.* Hough. *Providence.* Caswell.
" 21. *New York.* Hough. *Makerstoun.* Broun.
" 22. *Gothaab.* Block.
" 23. *New York.* Hough. *Gothaab.* Block.
" 24. *Gothaab.* Block.
" 25. *Gothaab.* Block.
" 27. *Christiania.* Hansteen.
" 28. *Gothaab.* Block.
Nov. 1. *New York,* Hough. *Gothaab.* Block.
" 2. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.
" 3. *Gothaab.* Block.
" 4. *Gothaab.* Block.
Nov. 5. *New Haven?* Herrick. Newton and Loomis.
" 5. *Hartford?* Herrick. Newton and Loomis.
" 5. *Gothaab.* Block.
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *New Britain.* Herrick. Newton and Loomis.
" 8. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 10. *Gothaab.* Block.
" 11. *Makerstoun.* Broun. *Gothaab.* Block.
" 12. *Gothaab.* Block.
" 13. *Albany.* Herrick. Newton and Loomis.
" 13. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 14. *Hamburg.* Schmidt.
" 15. *New York.* Hough. *Toronto.* Sabine.
" 15. *Gothaab.* Block.
" 16. *New Haven.* Herrick. Newton and Loomis.
" 16. *New York.* Hough. *Jakobshavn.* Rudolph.
" 16. *Christiania.* Hansteen. *Yakoutsk.* Kupffer.[1]
" 16. *Makerstoun.* Broun. *Dunse.* Stevenson.
" 16. *Gothaab.* Block.
" 17. *Gothaab.* Block.
" 18. *Makerstoun.* Broun. *Jakobshavn.* Rudolph.
" 19. *New York.* Hough.
" 24. *Makerstoun.* Broun.
" 25. *Gothaab.* Block.
" 27. *Gothaab.* Block.
" 28. *Jakobshavn.* Rudolph. *Gothaab.* Block.
" 29. *Gothaab.* Block.
Dec. 2. *Gothaab.* Block.
" 3. *Gothaab.* Block.
" 4. *Makerstoun.* Broun. *Gothaab.* Block.
" 5. *Gothaab.* Block.
" 6. *Gothaab.* Block.
" 7. *Gothaab.* Block.
" 8. *Parma.* Colla.
" 9. *Gothaab?* Block.
" 11. *Gothaab.* Block.
" 14. *Cambridge.* Bond. Lovering.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 15. *Gothaab.* Block.
" 16. *Gothaab.* Block.
" 18. *Jakobshavn.* Rudolph.
" 19. *Gothaab.* Block.
" 22. *Jakobshavn.* Rudolph.
" 23. *Gothaab.* Block.
" 29. *New Haven.* Herrick. Newton and Loomis.
" 29. *New York.* Hough. *Jakobshavn.* Rudolph.
" 29. *Makerstoun,* Broun. *Dunse.* Stevenson.
" 30. *France.* Hough.

[1] Annal. de l'Obsery. Phys. Centrale de Russie, 1857. Suppl. p. 3.

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Jan. 1. *Makerstoun.* Broun. *Gothaab.* Block.
" 2. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 4. *Gothaab.* Block.
" 6. *Nantes.* Perrey.[1]
" 8. *New York.* Hough. *Gothaab.* Block.
" 9. *Cambridge.* Bond. Lovering.
" 9. *New Haven.* Herrick. Newton and Loomis.
" 9. *New York.* Hough. *Newberry.* Johnson.
" 9. *Philadelphia.* Bache.[2]
" 9. *Providence, R. I.* Caswell. *Toronto.* Sabine.[3]
" 9. *Makerstoun.* Broun. *Dunse.* Stevenson.
" 9. *Gothaab.* Block. *Yakoutsk.* Kupffer.
" 10. *Hamburg.* Schmidt.
" 11. *Sitka.* Kupffer. *Gothaab.* Block.
" 12. *New Haven?* Herrick. Newton and Loomis.
" 12. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 13. *Sitka.* Kupffer.
" 19. *New York.* Hough.
" 19. *Makerstoun.* Broun. *Gothaab.* Block.
" 20. *Makerstoun.* Broun.
" 21. *Makerstoun.* Broun.
" 23. *Makerstoun.* Broun. *Gothaab.* Block.
" 24. *Makerstoun.* Broun. *Jakobshavn.* Rudolph.
" 26. *Gothaab.* Block.
" 27. *Makerstoun.* Broun. *Gothaab.* Block.
" 28. *Makerstoun.* Broun. *Gothaab.* Block.
" 29. *New Haven.* Herrick. Newton and Loomis.
" 29. *Makerstoun.* Broun. *Jakobshavn.* Rudolph.
" 30. *Makerstoun.* Broun.
Feb. 1. *Makerstoun.* Broun. *Gothaab.* Block.
" 4. *Gothaab.* Block.
" 5. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 6. *Gothaab.* Block.
" 8. *Makerstoun.* Broun. *Gothaab.* Block.
" 9. *Gothaab.* Block.
" 10. *Gothaab.* Block.
" 11. *Gothaab.* Block.
" 12. *Gothaab.* Block.
" 13. *New Haven?* Herrick. Newton and Loomis.
" 21. *Gothaab.* Block.
" 23. *Gothaab.* Block.
" 24. *New York.* Hough. *Newberry.* Johnson.
" 24. *Makerstoun.* Broun.
" 24. *Gothaab.* Block. *Jakobshavn.* Rudolph.
" 25. *New Haven.* Herrick. Newton and Loomis.

[1] Bull. de l'Acad. Brux. XII. Pt. I. p. 355.
[2] Magnet. and Meteor. Observ. Girard College, III. 2806.
[3] Magnet. and Meteor. Observ. Toronto. II. 542.

Feb. 25. *New York.* Hough. *Providence.* Caswell.
" 25. *Newberry.* Johnson.
" 25. *Christiania.* Hansteen. *Gothaab.* Block.
" 26. *Jakobshavn.* Rudolph. *Gothaab.* Block.
" 27. *New York.* Hough. *Makerstoun.* Broun.
" 28. *Makerstoun.* Broun. *Jakobshavn.* Rudolph.
" 28. *Lat.* 62° *S. Long.* 71° *E.* Clerk.[1]
Mar. 3. *Christiania.* Hansteen.
" 4. *Gothaab.* Block.
" 5. *Lat.* 62° *S. Long.* 85° *E.* Clerk.
" 7. *Lat.* 62° *S. Long.* 91° *E.* Clerk.
" 8. *Gothaab.* Block.
" 9. *New Haven?* Herrick. Newton and Loomis.
" 9. *Gothaab.* Block.
" 9. *Lat.* 62° *S. Long.* 92° *E.* Clerk.
" 10. *Makerstoun.* Broun.
" 11. *Gothaab.* Block.
" 12. *Toronto.* Sabine. *Gothaab.* Block.
" 13. *Toronto.* Sabine. *Gothaab.* Block.
" 13. *Jakobshavn.* Rudolph.
" 14. *Makerstoun.* Broun. *Gothaab.* Block.
" 15. *Gothaab.* Block.
" 15. *Lat.* 56° *S. Long.* 103° *E.* Clerk.
" 16. *New Haven?* Herrick. Newton and Loomis.
" 16. *Jakobshavn.* Rudolph.
" 18. *New Haven?* Herrick. Newton and Loomis.
" 18. *Makerstoun.* Broun.
" 18. *Lat.* 53° *S. Long.* 110° *E.* Clerk.
" 19. *Lat.* 51° *S. Long.* 111° *E.* Clerk.
" 19. *Makerstoun.* Broun.
" 20. *Lat.* 49° *S. Long.* 113° *E.* Clerk.
" 20. *Makerstoun.* Broun.
" 23. *Makerstoun.* Broun. *Jakobshavn.* Rudolph.
" 24. *Makerstoun.* Broun.
" 25. *Makerstoun.* Broun.
" 26. *Makerstoun.* Broun.
" 27. *Christiania.* Hansteen.
" 28. *Sitka.* Kupffer. *Christiania.* Hansteen.
" 28. *Makerstoun.* Broun.
" 29. *Makerstoun.* Broun.
" 31. *Gothaab.* Block.
Apr. 1. *Jakobshavn.* Rudolph.
" 7. *Gothaab.* Block.
" 9. *Gothaab.* Block.
" 13. *New Haven.* Herrick. Newton and Loomis.
" 13. *New York.* Hough. *Makerstoun.* Broun.
" 13. *Toronto.* Sabine.
" 14. *New York.* Hough.

[1] Phil. Trans. 1846, p. 437.

Apr. 15. *Makerstoun.* Broun.
" 19. *Sitka.* Kupffer. *Makerstoun.* Broun.
" 23. *Christiania.* Hansteen.
" 27. *New Haven.* Herrick. Newton and Loomis.
" 30. *Cambridge.* Bond. Lovering.
" 30. *New Haven.* Herrick. Newton and Loomis.[1]
" 30. *New York.* Hough. *Makerstoun.* Broun.
May 1. *New Haven?* Herrick. Newton and Loomis.
" 5. *New Haven.* Herrick. Newton and Loomis.
" 11. *Makerstoun.* Broun.
" 29. *New York.* Hough.
June 5. *New Haven?* Herrick. Newton and Loomis.
" 17. *New Haven?* Herrick. Newton and Loomis.
" 24. *New Haven?* Herrick. Newton and Loomis.
" 25. *Worcester.* Herrick. Newton and Loomis.
" 30. *Toronto.* Sabine.
July 4. *New York.* Hough.
" 5. *Toronto.* Sabine.
" 8. *Worcester.* Herrick. Newton and Loomis.
" 8. *Toronto.* Sabine.
" 24. *New Haven?* Herrick. Newton and Loomis.
" 24. *Worcester.* Herrick. Newton and Loomis.
" 24. *New York.* Hough. *Toronto.* Sabine.
" 25. *New York.* Hough.
" 28. *New Haven.* Bradley. Newton and Loomis.
" 31. *New Haven.* Herrick. Newton and Loomis.
Aug. 1. *New Haven.* Herrick. Newton and Loomis.
" 1. *New York.* Hough. *Toronto.* Sabine.
" 2. *Toronto.* Sabine.
" 3. *New York.* Hough.
" 4. *New Haven.* Herrick. Newton and Loomis.
" 26. *New York.* Hough.
" 27. *New York.* Hough.
" 29. *New Haven?* Herrick. Newton and Loomis.[2]
" 29. *Worcester.* Herrick. Newton and Loomis.
" 29. *Bilk.* Schmidt. *Huggate.* Rankin.[3]
" 29. *Makerstoun.* Broun. *Dunse.* Stevenson.
" 29. *Sitka.* Kupffer.
" 30. *From Dusseldorf to Cologne.* Schmidt.
" 30. *New Haven?* Herrick. Newton and Loomis.
" 30. *New York.* Hough. *Montreal.* Olmsted.
" 30. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 31. *Christiania.* Hansteen.
Sept. 1. *From Dusseldorf to Cologne.* Schmidt.
" 1. *Jakobshavn.* Rudolph.
" 2. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 3. *Toronto.* Sabine.

[1] Bull. de l'Acad. Brux. XII. Pt. II. p. 226.
[2] Bull. de l'Acad. Brux. XIII. Pt. I. p. 745.
[3] Proc. Brit. Assoc. XV. 15.

Sept. 4. *Gothaab.* Block.
" 7. *New Haven.* Herrick. Newton and Loomis.
" 7. *Toronto.* Sabine. *Gothaab.* Block.
" 8. *New York.* Hough. *Gothaab.* Block.
" 17. *Gothaab.* Block.
" 18. *Gothaab.* Block.
" 20. *Ausland.* Boué. *Gothaab.* Block.
" 24. *Cambridge.* Bond. Lovering.
" 24. *New Haven.* Herrick. Newton and Loomis.
" 24. *Jakobshavn.* Rudolph. *Toronto.* Sabine.
" 24. *From Dusseldorf to Cologne.* Schmidt.
" 25. *Cambridge.* Bond. Lovering.
" 25. *New Haven?* Herrick. Newton and Loomis.
" 25. *Toronto.* Sabine. *Gothaab.* Block.
" 25. *From Dusseldorf to Cologne.* Schmidt.
" 26. *Toronto.* Sabine. *Gothaab.* Block.
" 26. *Bilk.* Schmidt. *Makerstoun.* Broun.
" 27. *New York.* Hough. *Gothaab.* Block.
" 27. *New Haven.* Herrick. Newton and Loomis.
" 27. *Makerstoun.* Broun. *Jakobshavn.* Rudolph.
" 28. *Gothaab.* Block.
" 29. *Jakobshavn.* Rudolph. *Gothaab.* Block.
Oct. 1. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.
" 2. *Makerstoun.* Broun.
" 4. *Gothaab.* Block.
" 5. *Gothaab.* Block.
" 6. *Gothaab.* Block.
" 7. *Gothaab.* Block.
" 8. *Gothaab.* Block.
" 9. *New York.* Hough.
" 9. *New Haven.* Herrick. Newton and Loomis.
" 19. *Jakobshavn.* Rudolph.
" 20. *Toronto.* Sabine. *Makerstoun.* Broun.
" 21. *Cambridge.* Bond. Lovering.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *Newberry.* Johnson. *New York.* Hough.
" 21. *Gothaab.* Block.
" 22. *Makerstoun.* Broun.
" 23. *Jakobshavn.* Rudolph. *Gothaab.* Block.
" 28. *Gothaab.* Block.
" 29. *Gothaab.* Block.
" 31. *Christiania.* Hansteen.
" 31. *Makerstoun.* Broun. *Gothaab.* Block.
Nov. 1. *Christiania.* Hansteen.
" 2. *Sitka.* Kupffer. *Gothaab.* Block.
" 3. *Gothaab.* Block.
" 4. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 5. *Christiania.* Hansteen.
" 5. *Makerstoun.* Broun. *Gothaab.* Block.
" 9. *Toronto.* Sabine.

Nov. 16. *Gothaab.* Block.
" 17. *Makerstoun.* Broun.
" 17. *Dunse.* Stevenson. *Gothaab.* Block.
" 18. *Gothaab.* Block.
" 19. *Gothaab.* Block.
" 20. *Gothaab.* Block.
" 21. *Jakobshavn.* Rudolph.
" 27. *New Haven.* Herrick. Newton and Loomis.
" 27. *Toronto.* Sabine. *Jakobshavn.* Rudolph.
Dec. 2. *New Haven.* Herrick. Newton and Loomis.
" 2. *Gothaab.* Block.
" 3. *Cambridge.* Bond. Lovering. *Gothaab.* Block.
" 3. *New Haven.* Herrick. Newton and Loomis.
" 3. *New York.* Hough. *Manchester.* Sturgeon.[1]
" 3. *Eutin.* Schmidt. *Near Nottingham.* Lowe.[2]
" 3. *Makerstoun.* Broun. *Dunse.* Stevenson.
" 3. *Jakobshavn.* Rudolph. *Yakoutsk.* Kupffer.
" 4. *Bonn.* Schmidt. *Amsterdam.*[3]
" 4. *Gothaab.* Block.
" 5. *Cambridge.* Bond. Lovering. *Gothaab.* Block.
" 6. *Gothaab.* Block.
" 13. *Makerstoun.* Broun.
" 14. *Bonn.* Schmidt.
" 15. *Gothaab.* Block.
" 16. *New Haven?* Herrick. Newton and Loomis.
" 16. *Jakobshavn.* Rudolph.
" 17. *Jakobshavn.* Rudolph.
" 26. *Jakobshavn.* Rudolph.
" 27. *Gothaab.* Block.
" 29. *Rheims.* Coulvier-Gravier. *Spain.* Rico.[4]
" 30. *New Haven?* Herrick. Newton and Loomis.
" 30. *Gothaab.* Block.
" 31. *New Haven?* Herrick. Newton and Loomis.
" 31. *Gothaab.* Block.

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Jan. 3. *New Haven?* Herrick. Newton and Loomis.
" 4. *London.*[5] *Gothaab.* Block.
" 5. *Gothaab.* Block.
" 11. *Gothaab.* Block.
" 12. *Gothaab.* Block.
" 13. *Gothaab.* Block.
" 14. *Jakobshavn.* Rudolph. *Gothaab.* Block.
" 16. *Gothaab.* Block.
" 17. *Gothaab.* Block.
" 19. *New Haven?* Herrick. Newton and Loomis.
Jan. 20. *New Haven?* Herrick. Newton and Loomis.
" 21. *Gothaab.* Block.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *New York.* Hough. *Newberry.* Johnson.
" 24. *New York.* Hough. *Gothaab.* Block.
" 27. *Gothaab.* Block.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *New York.* Hough. *Providence.* Caswell.
" 28. *Jakobshavn.* Rudolph.
" 31. *New Haven?* Herrick. Newton and Loomis.
Feb. 1. *Gothaab.* Block.
" 4. *Gothaab.* Block.
" 14. *Newberry.* Johnson.
" 18. *Bonn.* Schmidt. *Gothaab.* Block.
" 19. *New Haven?* Herrick. Newton and Loomis.
" 19. *Gothaab.* Block.
" 20. *Gothaab.* Block.
" 21. *Jakobshavn.* Rudolph. *Gothaab.* Block.
" 22. *Gothaab.* Block.
" 23. *Gothaab.* Block.
" 24. *Jakobshavn.* Rudolph. *Gothaab.* Block.
" 25. *New Haven.* Herrick. Newton and Loomis.
" 25. *Newberry.* Johnson. *Providence.* Caswell.
" 25. *Geneva.* Schmidt. *Makerstoun.* Broun.
" 26. *Makerstoun.* Broun. *Jakobshavn.* Rudolph.
" 27. *Gothaab.* Block.
" 28. *Gothaab.* Block.
Mar. 1. *Gothaab.* Block.
" 7. *Jakobshavn.* Rudolph.
" 13. *Christiania.* Hansteen. *Gothaab.* Block.
" 14. *New Haven?* Herrick. Newton and Loomis.
" 14. *Geneva.* Schmidt. *Gothaab.* Block.
" 15. *Gothaab.* Block.
" 16. *Makerstoun.* Broun.
" 17. *New Haven.* Herrick. Newton and Loomis.
" 18. *Christiania.* Hansteen.
" 19. *Gothaab.* Block.
" 20. *Gothaab.* Block.
" 25. *New York.* Hough. *Christiania.* Hansteen.
" 27. *Gothaab.* Block.
" 28. *New York.* Hough. *Gothaab.* Block.
" 31. *Gothaab.* Block.
Apr. 4. *Gothaab.* Block.
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *Makerstoun.* Broun.
" 12. *New Haven?* Herrick. Newton and Loomis.
" 14. *New York.* Hough.
" 15. *Cambridge.* Bond. Lovering.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *New York.* Hough. *Christiania.* Hansteen.

[1] Phil. Mag. Third Series. XXVIII. p. 70.
[2] Athenæum, 1845, p. 1203.
[3] Pogg. Ann. LXVII. 591.
[4] Mem. Acad. Cienc. Madrid, III. 77.
[5] L'Institut. Sci. Math. Phys. &c. XIV. 24.

Apr. 16. *Cambridge.* Bond. Lovering.
" 16. *New Haven.* Herrick. Newton and Loomis.
" 16. *New York.* Hough. *Providence.* Caswell.
" 16. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 18. *Toronto.* Sabine.
" 19. *Toronto.* Sabine.
" 22. *Christiania.* Hansteen.
" 24. *New York.* Hough.
" 25. *New York.* Hough.
May 3. *New York.* Hough.
" 3. *New Haven?* Herrick. Newton and Loomis.[1]
" 4. *Cambridge.* Bond. Lovering.
" 4. *New York.* Hough. *Christiania.* Hansteen.
" 10. *New Haven?* Herrick. Newton and Loomis.
" 11. *Toronto.* Sabine.
" 12. *New Haven.* Herrick. Newton and Loomis.
" 13. *New York.* Hough.
" 13. *New Haven.* Herrick. Newton and Loomis.
" 14. *New York.* Hough.
" 17. *New York.* Hough.
" 18. *New York.* Hough.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *New York.* Hough. *Providence.* Caswell.
" 21. *New York.* Hough.
" 23. *New York.* Hough.
" 23. *Toronto.* Sabine.
" 30. *New York.* Hough.
" 31. *Toronto.* Sabine.
June 8. *At Sea.* Lyell. Hough.
" 10. *New York.* Hough.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *New York.* Hough.
July 12. *Cambridge.* Bond. Lovering.
" 15. *New Haven?* Herrick. Newton and Loomis.
" 20. *New York.* Hough.
" 24. *Toronto.* Sabine.
" 25. *New Haven?* Herrick. Newton and Loomis.
" 27. *New York.* Hough.
" 31. *New York.* Hough.
Aug. 2. *New York.* Hough.
" 6. *New York.* Hough.
" 10. *New York.* Hough.
" 11. *Cambridge.* Bond. Lovering.
" 11. *New Haven.* Herrick. Newton and Loomis.
" 12. *New Haven.* Herrick. Newton and Loomis.
" 13. *Toronto.* Sabine.
" 14. *New York.* Hough.

[1] Bull. de l'Acad. Brux. XIV. Pt. I. p. 420.

Aug. 15. *New York.* Hough. *Repulse Bay.* Rae.
" 16. *Toronto.* Sabine.
" 18. *New Haven?* Herrick. Newton and Loomis.
" 21. *Christiania.* Hansteen.
" 22. *Christiania.* Hansteen.
" 24. *Cambridge.* Bond. Lovering.
" 24. *New Haven.* Herrick. Newton and Loomis.
" 24. *New York.* Hough. *Providence.* Caswell.
" 24. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 25. *Christiania.* Hansteen.
" 27. *Comrie, Perthshire.* M'Farlane.[1]
" 27. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 28. *Bonn.* Schmidt. *Christiania.* Hansteen.
" 28. *Toronto.* Sabine.
" 29. *New Haven?* Herrick. Newton and Loomis.
" 29. *Ridgefield, Conn.* Bradley.
" 29. *Christiania.* Hansteen.
" 30. *New Haven?* Herrick. Newton and Loomis.
" 31. *Christiania.* Hansteen.
Sept. 1. *New York.* Hough. *Christiania.* Hansteen.
" 9. *New York.* Hough.
" 10. *Cambridge.* Bond. Lovering.
" 10. *New York.* Hough. *Makerstoun.* Broun.
" 10. *Christiania.* Hansteen.
" 11. *Cambridge.* Bond. Lovering.
" 11. *New York.* Hough. *Toronto.* Sabine.
" 11. *Christiania.* Hansteen.
" 11. *Makerstoun.* Broun. *Jakobshavn.* Rudolph.
" 12. *Toronto.* Sabine. *Christiania.* Hansteen.
" 13. *Toronto.* Sabine. *Christiania.* Hansteen.
" 14. *Toronto.* Sabine. *Christiania.* Hansteen.
" 16. *Jakobshavn.* Rudolph.
" 17. *Christiania.* Hansteen.
" 19. *Christiania.* Hansteen.
" 20. *Christiania.* Hansteen.
" 21. *Ashfield, Mass.* Herrick. Newton and Loomis.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *New York.* Hough.
" 21. *Providence.* Caswell. *Toronto.* Sabine.
" 21. *Durham.* Chevallier. *Norwich.* Marshall.[2]
" 21. *Christiania.* Hansteen. *Comrie.* M'Farlane.
" 21. *Makerstoun.* Broun.
" 22. *Cambridge.* Bond. Lovering.
" 22. *Ashfield, Mass.* Herrick. Newton and Loomis.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 22. *Repulse Bay.* Rae.[3] *Toronto.* Sabine.
" 22. *New York.* Hough. *Christiania.* Hansteen.

[1] Athenæum, 1846, p. 917.
[2] Proc. Brit. Assoc. XVI. 7.
[3] Narrative of an Expedition, &c.

Sept. 22. *Makerstoun.* Broun. *Hobarton.* Sabine.
" 22. *Yakoutsk.* Kupffer. *Bonn.* Schmidt.
" 23. *Cambridge.* Bond. Lovering.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *New York.* Hough. *Providence.* Caswell.
" 23. *Hartford.* Herrick. Newton and Loomis.
" 23. *Christiania.* Hansteen.
" 24. *Christiania.* Hansteen.
" 25. *New York.* Hough.
" 27. *England.* Hough.
Oct. 2. *New York.* Hough. *Toronto.* Sabine.
" 7. *Cambridge.* Bond. Lovering.
" 7. *New Haven.* Herrick. Newton and Loomis.
" 8. *New York.* Hough. *Makerstoun.* Broun.
" 9. *Makerstoun.* Broun. *Toronto.* Sabine.
" 10. *New Haven?* Herrick. Newton and Loomis.
" 11. *New Haven.* Herrick. Newton and Loomis.
" 11. *Toronto.* Sabine. *Christiania.* Hansteen.
" 12. *Jakobshavn.* Rudolph.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *New York.* Hough.
" 16. *Repulse Bay.* Rae.
" 17. *Repulse Bay.* Rae. *Ireland.* Hough.
" 18. *Repulse Bay.* Rae.
" 19. *Cambridge.* Bond. Lovering.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *New York.* Hough. *Newberry.* Johnson.
" 19. *Christiania.* Hansteen. *Toronto.* Sabine.
" 19. *Makerstoun.* Broun. *Dunse.* Stevenson.
" 19. *Jakobshavn.* Rudolph.
" 20. *Christiania.* Hansteen.
" 21. *Cambridge.* Bond. Lovering.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *New York.* Hough.
" 21. *Christiania.* Hansteen. *Repulse Bay.* Rae.
" 21. *Jakobshavn.* Rudolph.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 22. *Newberry.* Johnson.
" 22. *Makerstoun.* Broun. *Jakobshavn.* Rudolph.
" 24. *New Haven.* Herrick. Newton and Loomis.
" 25. *Jakobshavn.* Rudolph.
" 27. *Repulse Bay.* Rae.
" 28. *Repulse Bay.* Rae. *Jakobshavn.* Rudolph.
" 29. *Repulse Bay.* Rae.
Nov. 5. *Repulse Bay.* Rae.
" 6. *Repulse Bay.* Rae.
" 11. *New Haven?* Herrick. Newton and Loomis.[1]
" 11. *Bonn.* Schmidt.

[1] Amer. Journ. Sci. Second Series, III. 126.

Nov. 13. *New York.* Hough.
" 13. *Bonn.* Schmidt. *Christiania.* Hansteen.
" 14. *Repulse Bay.* Rae.
" 16. *Christiania.* Hansteen.
" 17. *New Haven.* Herrick. Newton and Loomis.
" 17. *New York.* Hough.
" 17. *Bonn.* Schmidt. *Brussels.* Quetelet.
" 17. *Makerstoun.* Broun. *Dunse.* Stevenson.
" 17. *Kingstown, near London.* Starkey.
" 17. *Repulse Bay.* Rae. *Christiania.* Hansteen.
" 18. *Brussels.* Quetelet.
" 20. *Repulse Bay.* Rae.
" 21. *Bonn.* Schmidt.
" 22. *Repulse Bay.* Rae. *Jakobshavn.* Rudolph.
" 23. *Repulse Bay.* Rae.
" 25. *Repulse Bay.* Rae.
" 26. *Yakoutsk.* Kupffer.
" 30. *Jakobshavn.* Rudolph.
Dec. 4. *New Haven?* Herrick. Newton and Loomis.
" 4. *Amsterdam.*[1]
" 5. *Repulse Bay.* Rae.
" 9. *Cambridge.* Bond. Lovering.
" 9. *New Haven.* Herrick. Newton and Loomis.
" 9. *New York.* Hough. *Newberry.* Johnson.
" 9. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.
" 9. *Makerstoun.* Broun.
" 10. *Christiania.* Hansteen.
" 11. *Bonn.* Schmidt. *Christiania.* Hansteen.
" 13. *Bonn.* Schmidt. *Repulse Bay.* Rae.
" 13. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.
" 14. *New Haven?* Herrick. Newton and Loomis.
" 14. *Repulse Bay.* Rae.
" 15. *Repulse Bay.* Rae. *Jakobshavn.* Rudolph.
" 16. *Bonn.* Schmidt.
" 17. *Repulse Bay.* Rae. *Bonn.* Schmidt.
" 17. *Jakobshavn.* Rudolph.
" 18. *Repulse Bay.* Rae.
" 21. *Repulse Bay.* Rae.
" 22. *New York.* Hough.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *New York.* Hough.
" 23. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.

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Jan. 2. *Repulse Bay.* Rae.
" 3. *Repulse Bay.* Rae.
" 4. *Repulse Bay.* Rae.
" 6. *Repulse Bay.* Rae.

[1] Pogg. Ann. LXVII. 591.

Jan. 8. *Jakobshavn.* Rudolph.
" 11. *Repulse Bay.* Rae.
" 12. *Repulse Bay.* Rae. *Jakobshavn.* Rudolph.
" 13. *Bonn.* Schmidt. *Christiania.* Hansteen.
" 13. *Repulse Bay.* Rae.
" 14. *Bonn.* Schmidt. *Repulse Bay.* Rae.
" 16. *Repulse Bay.* Rae.
" 17. *New Haven?* Herrick. Newton and Loomis.
" 17. *New York.* Hough.
" 17. *Repulse Bay.* Rae. *Jakobshavn.* Rudolph.
" 18. *Repulse Bay.* Rae. *Jakobshavn.* Rudolph.
" 20. *Christiania.* Hansteen.
" 21. *New Haven?* Herrick. Newton and Loomis.
" 25. *New York.* Hough.
" 26. *Repulse Bay.* Rae.
" 28. *Repulse Bay.* Rae.
" 30. *Makerstoun.* Broun. *Dunse.* Stevenson.
Feb. 5. *Jakobshavn.* Rudolph.
" 6. *Cambridge.* Bond. Lovering.
" 6. *New Haven?* Herrick. Newton and Loomis.
" 6. *Makerstoun.* Broun. *Dunse.* Stevenson.
" 6. *Jakobshavn.* Rudolph.
" 7. *New Haven?* Herrick. Newton and Loomis.
" 9? *Repulse Bay.* Rae.
" 10. *Repulse Bay.* Rae.
" 21. *New York.* Hough. *Jakobshavn.* Rudolph.
" 22. *Christiania.* Hansteen. *Toronto.* Sabine.
Mar. 1. *Christiania.* Hansteen.
" 4. *New York.* Hough. *Christiania.* Hansteen.
" 5. *New York.* Hough.
" 6. *New York.* Hough.
" 8. *Cambridge.* Bond. Lovering.
" 8. *New Haven.* Herrick. Newton and Loomis.
" 8. *Newberry.* Johnson.
" 9. *Jakobshavn.* Rudolph.
" 10. *Christiania.* Hansteen.
" 11. *New Haven?* Herrick. Newton and Loomis.
" 12. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.
" 13. *Christiania.* Hansteen.
" 14. *Jakobshavn.* Rudolph.
" 15. *New York.* Hough.
" 17. *New Haven?* Herrick. Newton and Loomis.
" 17. *Eutin.* Schmidt.
" 18. *New York.* Hough.
" 19. *Cambridge.* Bond. Lovering.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *Newberry.* Johnson. *New York.* Hough.
" 19. *Boston. Washington, D. C.* Hough.
" 19. *Toronto.* Sabine.
" 19. *Providence, R. I.* Caswell.
Mar. 19. *Brussels.* Quetelet. *Buxton.* Mann.[1]
" 19. *London.* Adams. *Amsterdam, &c.*[2]
" 19. *Cambridge, Eng.* Challis and Potter.
" 19. *Makerstoun.* Broun.
" 22. *New York.* Hough.
" 28. *New York.* Hough.
Apr. 3. *New York.* Hough. *Christiania.* Hansteen.
" 3. *Makerstoun.* Broun. *Repulse Bay.* Rae.
" 4. *New York.* Hough.
" 6. *New York.* Hough.
" 7. *Cambridge.* Bond. Lovering.
" 7. *Boston.* Hale. Lovering.
" 7. *New Haven.* Herrick. Newton and Loomis.[3]
" 7. *Washington and Baltimore.* Hough.
" 7. *New York.* Hough. *Toronto.* Sabine.
" 8. *Toronto.* Sabine.
" 10. *New York.* Hough.
" 11. *New York.* Hough.
" 13. *Christiania.* Hansteen.
" 14. *Christiania.* Hansteen.
" 15. *Christiania.* Hansteen.
" 16. *Cambridge.* Bond. Lovering.
" 16. *Christiania.* Hansteen.
" 19. *Toronto.* Sabine.
" 20. *Hobarton, Van Dieman's Land.* Sabine.[4]
" 21. *Christiania.* Hansteen. *Hobarton.* Sabine.
May 7. *New York.* Hough. *Toronto.* Sabine.
" 9. *New York.* Hough.
" 15. *Cambridge.* Bond. Lovering.
" 15. *New York.* Hough. *Providence.* Caswell.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *Sitka.* Kupffer.[5]
June 6. *Brussels.* Quetelet.
" 12. *New Haven?* Herrick. Newton and Loomis.
" 12. *New York.* Hough. *Newberry.* Johnson.
" 12. *Providence.* Caswell. *Toronto.* Sabine.
July 9. *New Haven.* Herrick. Newton and Loomis.
" 9. *New York.* Hough. *Providence.* Caswell.
" 9. *Toronto.* Sabine.
" 11. *New Haven.* Herrick. Newton and Loomis.
" 11. *New York.* Hough. *Toronto.* Sabine.
" 12. *New York.* Hough.
Aug. 3. *Cambridge.* Bond. Lovering.
" 3. *New York.* Hough.
" 4. *New Haven.* Herrick. Newton and Loomis.

[1] Athenæum, 1847, p. 335.
[2] Proc. Brit. Assoc. XVI. 7.
[3] Amer. Journ. Sci. New Series, III. 440.
[4] Magnet. and Meteor. Observ. Hobarton, III. 324.
[5] Annal. de l'Observ. Phys. Centrale de Russie, 1848, p. 373.

Aug. 4. *New York.* Hough. *Toronto.* Sabine.
" 4. *Sitka.* Kupffer.
" 16. *Toronto.* Sabine.
" 21. *Cambridge.* Bond. Lovering. *Toronto.* Sabine.
" 21. *Christiania.* Hansteen. *Sitka.* Kupffer.
" 22. *Near Rankin's Inlet.* Rae. *Sitka.* Kupffer.
" 23. *Makerstoun.* Broun.
" 24. *Sitka.* Kupffer.
" 25. *New York.* Hough.
Sept. 10. *New York.* Hough.
" 12. *Christiania.* Hansteen. *Sitka.* Kupffer.
" 13. *New Haven.* Herrick. Newton and Loomis.
" 13. *Sitka.* Kupffer.
" 15. *England. Germany. Irkutsk.* Kupffer.[1] Boué.
" 16. *New Haven.* Herrick. Newton and Loomis.
" 16. *New York.* Hough. *Providence.* Caswell.
" 24. *England.* Hough. *Christiania.* Hansteen.
" 24. *Hobarton.* Sabine.
" 25. *Hobarton.* Sabine.
" 26. *England.* Hough. *Christiania.* Hansteen.
" 26. *Makerstoun.* Broun. *Hobarton.* Sabine.
" 27. *Inverness, Scotland.* Hough.
" 28. *Near Louviers.*[2]
" 29. *Cambridge.* Bond. Lovering.
" 29. *Worcester.*[3] Chandler.
" 29. *New Haven.* Herrick. Newton and Loomis.
" 29. *New York.* Hough. *Providence.* Caswell.
" 29. *Westmoreland.* Sturgeon.[4] *Swansea.* Hough.
" 29. *Christiania.* Hansteen. *Carlisle.* Hough.
" 29. *Makerstoun.* Broun. *Jakobshavn.* Rudolph.
" 30. *Westmoreland.* Sturgeon.
Oct. 1. *Christiania.* Hansteen. *Borsley. Havre.*[4]
" 3. *Carlisle.*[5]
" 5. *Christiania.* Hansteen.
" 6. *Christiania.* Hansteen. *Carlisle.*
" 7. *Jakobshavn.* Rudolph.
" 8. *Makerstoun.* Broun. *Toronto.* Sabine.
" 12. *Christiania.* Hansteen. *Toronto.* Sabine.
" 13. *New York.* Hough. *Christiania.* Hansteen.
" 13. *Westmoreland.* Sturgeon.
" 14. *Bonn.* Schmidt. *Toronto.* Sabine.
" 15. *Christiania.* Hansteen. *Toronto.* Sabine.
" 16. *Makerstoun.* Broun.
" 19. *Peru, N. Y.* Herrick. Newton and Loomis.
" 19. *Makerstoun.* Broun.

[1] Annuaire Magnet. et Meteor. de Russie, 1844.
[2] Compt. Rend. XXV. 765.
[3] Fifteenth Report of the Lunatic Asylum, p. 77, &c.
[4] Mem. Lit. and Phil. Soc. Manchest. VIII. 381.
[5] Athenæum, 1847, p. 1034 and 1058.

Oct. 22. *Hobarton.* Sabine. *Toronto.* Sabine.
" 23. *New York.* Hough. *Hobarton.* Sabine.
" 23. *Barnaoul.* Kupffer. *Christiania.* Hansteen.
" 24. *New York.* Hough. *Hobarton.* Sabine.
" 24. *Durham.* Chevallier. *Cambridge.* Challis.[1]
" 24. *Westmoreland.* Sturgeon. *York.* Phillips.
" 24. *Oxford.* Rowell. *Blackheath.* Glaisher.[2]
" 24. *France. Brussels.* Quetelet. Arago.
" 24. *Germany.* Jahn.[3] *Spain.* Rico.
" 24. *Ireland. Christiania.* Hansteen.
" 24. *Barnaoul and Bogoslowski.* Kupffer.
" 25. *Paris.* Hough. *Christiania.* Hansteen.
" 25. *Makerstoun.* Broun. *Barnaoul.* Kupffer.[4]
" 26. *Jakobshavn.* Rudolph.
" 27. *Cambridge, Oxford, &c. England.* Hough.
" 29. *Makerstoun.* Broun.
" 31. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.
Nov. 1. *New Haven.* Herrick. Newton and Loomis.
" 1. *New York.* Hough. *Toronto.* Sabine.
" 1. *France.* Coulvier-Gravier. Arago.
" 1. *Makerstoun.* Broun.
" 1. *Sitka.* Kupffer. *Westmoreland.* Sturgeon.
" 2. *Bonn.* Schmidt.
" 3. *New York.* Hough. *Christiania.* Hansteen.
" 5. *Toronto.* Sabine.
" 6. *Sitka.* Kupffer.
" 7. *New York.* Hough. *Sitka.* Kupffer.
" 8. *Sitka.* Kupffer.
" 9. *Toronto.* Sabine.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 10. *Christiania.* Hansteen.
" 11. *New Haven.* Herrick. Newton and Loomis.
" 11. *Jakobshavn.* Rudolph.
" 12. *New Haven.* Herrick. Newton and Loomis.
" 12. *Providence, R. I?* Caswell.
" 13. *Christiania.* Hansteen.
" 14. *New York.* Hough.
" 17. *New York.* Hough.
" 17. *Christiania.* Hansteen.
" 18. *Brussels.* Quetelet.
" 19. ——— Schmidt. Jahn.
" 19. *Makerstoun.* Broun. *Dunse.* Stevenson.
" 22. *New York.* Hough.
" 22. *Catharinebourg.* Kupffer.[5]

[1] Athenæum, 1847, p. 1152.
[2] Edin. New Phil. Journ. XLIV. 91. Phil. Mag. XXXI. 369.
[3] Sitzungsbericht. der Kaiserl. Akademie, &c. Wien. XXIII. 262.
[4] Annal. de l'Observ. Phys. Centrale de Russie, 1847, pp. 233 et 353.
[5] Annal. de l'Observ. Phys. Centrale de Russie, 1847, p. 147.

Nov. 22. *Koursk and Bogoslowski.* Kupffer.[1]
" 25. *New Haven.* Herrick. Newton and Loomis.
" 25. *New York.* Hough. *Toronto.* Sabine.
" 25. *Worcester.* Chandler. *Makerstoun.* Broun.
" 26. *New Haven?* Herrick. Newton and Loomis.
" 26. *New York.* Hough. *Toronto.* Sabine.
" 26. *Providence?* Caswell. *Worcester.* Chandler.
" 26. *Makerstoun.* Broun.
" 27. *New York.* Hough. *Makerstoun.* Broun.
Dec. 1. *Christiania.* Hansteen.
" 2. *Christiania.* Hansteen.
" 3. *Christiania.* Hansteen.
" 4. *New Haven?* Herrick. Newton and Loomis.
" 4. *Christiania.* Hansteen.
" 7. *New York.* Hough.
" 8. *New York.* Hough. *Jakobshavn.* Rudolph.
" 8. *Sitka.* Kupffer. ——— Schmidt.
" 10. ——— Schmidt.
" 15. *New Haven?* Herrick. Newton and Loomis.
" 16. *Wurtemberg.* Demidoff.[2] *Toronto.* Sabine.
" 17. *New York.* Hough. *Toronto.* Sabine.
" 17. *Brussels.* Quetelet. *Eutin.* Schmidt.
" 17. *France.* Rigault. Arago.
" 17. *Neuchatel.* Coulon.[3]
" 17. *Italy.* Demidoff. Gorki. Kupffer.[4]
" 17. *Yakoutsk and Sitka.* Kupffer.
" 18. *Toronto.* Sabine. *Eutin.* Schmidt.
" 18. *Yakoutsk.* Kupffer.
" 19. *New Haven?* Herrick. Newton and Loomis.
" 19. *Worcester.* Chandler. *Christiania.* Hansteen.
" 19. *Catharinebourg.* Kupffer. *Eutin.* Schmidt.
" 20. *New Haven.* Herrick. Newton and Loomis.
" 20. *New York.* Hough. *Eutin.* Schmidt.
" 20. *Makerstoun.* Broun.
" 20. *Zlatoouste.* Kupffer.[5] *Hobarton.* Sabine.
" 29. *Jakobshavn.* Rudolph.
" 31. *Leipsic. Carlsruhe, Wurtemberg, &c.* Jahn.

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Jan. 3. *New Haven?* Herrick. Newton and Loomis.
" 3. *New York.* Hough.

[1] Annal. de l'Observ. Phys. Centrale de Russie, 1858, Suppl. p. 85.
[2] L'Institut. Sci. Math. Phys, &c. XVI. 10.
[3] Bull. Soc. Sci. Nat. Neuchatel. II. 194.
[4] Annal. de l'Observ. Phys. Centrale de Russie, 1852, Suppl. p. 49.
[5] Annal. de l'Observ. Phys. Centrale de Russie, 1847, p. 387.

Jan. 3. *Kingston and Toronto.* Lefroy.[1]
" 6. *New York.* Hough.
" 6. *London, Canada West.* Lefroy.
" 10. *Jakobshavn.* Rudolph.
" 11. *New York.* Hough.
" 11. *Kingston, Toronto, and London.* Lefroy.
" 12. *Christiania.* Hansteen. *Yakoutsk.* Kupffer.
" 13. *Christiania.* Hansteen. *Dunse.* Stevenson.
" 14. ——— Coulvier-Gravier.[2]
" 15. *Kingston and London.* Lefroy
" 16. *East Hartford.* Herrick. Newton and Loomis.
" 16. *New York.* Hough.
" 16. *Kingston, Toronto, and London.* Lefroy.
" 17. *New York.* Hough.
" 19. *New York.* Hough.
" 20. *Montreal.* Hough.
" 23. *New Haven?* Herrick. Newton and Loomis.
" 23. *New York.* Hough. *Kingston.* Lefroy.
" 23. *Russia?* Hough.
" 24. *Christiania.* Hansteen. *Russia?* Hough.
" 25. *Russia?* Hough.
" 26. *Christiania.* Hansteen.
" 27. *Jakobshavn.* Rudolph.
" 28. *Cambridge.* Bond. Lovering.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *New York.* Hough. *Newberry.* Johnson.
" 28. *Montreal, Kingston, and London.* Lefroy.
" 28. *Bonn.* Schmidt.
" 29. *Kingston.* Lefroy. *Yakoutsk.* Kupffer. Jahn.
Feb. 2. *Jakobshavn.* Rudolph.
" 4. *New Haven?* Herrick. Newton and Loomis.
" 6. *New Haven.* Bradley. Newton and Loomis.
" 6. *Christiania.* Hansteen.
" 6. *Quebec, Montreal, and Kingston.* Lefroy.
" 7. *New Haven.* Herrick. Newton and Loomis.
" 7. *New York.* Hough. *Toronto.* Lefroy.
" 7. *Quebec, Montreal, and Kingston.* Lefroy.
" 8. *New Haven.* Herrick. Newton and Loomis.
" 8. *New York.* Hough. *Providence.* Caswell.
" 8. *Newberry.* Johnson. *Toronto.* Lefroy.
" 8. *Quebec, Montreal, and Kingston.* Lefroy.
" 12. *Montreal.* Lefroy.
" 13. *Montreal.* Lefroy.
" 14. *Christiania.* Hansteen.
" 14. *Montreal and Toronto.* Lefroy.
" 15. *New York.* Hough.
" 18. *New York.* Hough.

[1] Phil. Mag. Third Series, XXXVI. 457.
[2] Compt. Rend. XXVIII. 89.

Feb. 20. *New Haven?* Herrick. Newton and Loomis.
" 20. *New York.* Hough.
" 20. *Cumberland, Md.* Herrick. Newton and L.
" 20. *London, Canada West.* Lefroy.
" 20. *Makerstoun.* Broun. *England.* Hough.
" 20. *Dunse.* Stevenson.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *New York.* Hough. *Providence.* Caswell.
" 21. *Newberry.* Johnson. *Worcester.* Chandler.[1]
" 21. *Quebec and Montreal.* Lefroy.
" 21. *Kingston, Toronto, and London.* Lefroy.
" 21. *Jakobshavn.* Rudolph.
" 21. *Christiania.* Hansteen. ——— Schmidt.
" 21. *Makerstoun.* Broun. *Yakoutsk.* Kupffer.
" 21. *Leipsic, Pegau, Lutzen, &c.* Jahn.
" 22. *Toronto.* Lefroy. *Sitka.* Kupffer.
" 22. *Makerstoun.* Broun. *Dunse.* Stevenson.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *New York.* Hough. *Providence.* Caswell.
" 23. *Worcester.* Chandler.
" 23. *Quebec and Montreal.* Lefroy.
" 23. *Kingston, Toronto, and London.* Lefroy.
" 23. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.
" 24. *Cambridge.* Bond. Lovering.
" 24. *New Haven.* Herrick. Newton and Loomis.
" 24. *New York.* Hough. *Providence.* Caswell.
" 24. *Quebec and Montreal.* Lefroy.
" 24. *Kingston, Toronto, and London.* Lefroy.
" 24. *Jakobshavn.* Rudolph.
" 24. *Yakoutsk and Barnaoul.* Kupffer.
" 25. *Cambridge.* Bond. Lovering.
" 25. *Newberry.* Johnson.
" 25. *Quebec and Montreal.* Lefroy.
" 26. *New Haven.* Herrick. Newton and Loomis.
" 27. *Montpelier.* Roche.
" 28. *Quebec.* Lefroy.
" 29. *Kingston.* Lefroy.
Mar. 1. *Montreal and Toronto.* Lefroy.
" 4. *Christiania.* Hansteen.
" 6. *New York.* Hough.
" 6. *Montreal, Kingston, and Toronto.* Lefroy.
" 7. *Bonn.* Schmidt. Boué.
" 8. *Cambridge.* Bond. Lovering.
" 8. *Toronto and London.* Lefroy.
" 10. *Kingston.* Lefroy.
" 14. *Quebec, Montreal, and Toronto.* Lefroy.
" 16. *Quebec and Montreal.* Lefroy.
" 16. *Kingston and Toronto.* Lefroy.

[1] Sixteenth Report of the Lunatic Asylum, p. 60.

Mar. 17. *New York.* Hough. *Makerstoun.* Broun.
" 19. *New York.* Hough.
" 19. *Kingston and Toronto.* Lefroy.
" 19. *Makerstoun.* Broun. ——— Schmidt.
" 20. *Quebec.* Lefroy.
" 21. *Makerstoun.* Broun.
" 22. *Cambridge.* Bond. Lovering.
" 23. *New York.* Hough. *Quebec.* Lefroy.
" 24. *Cambridge.* Bond. Lovering.
" 24. *New Haven.* Herrick. Newton and Loomis.
" 24. *New York.* Hough. *Providence.* Caswell.
" 24. *Quebec and Montreal.* Lefroy.
" 24. *Kingston and Toronto.* Lefroy.
" 24. *Makerstoun.* Broun. *Hobarton.* Sabine.
" 25. *Cambridge.* Bond. Lovering.
" 25. *New York.* Hough.
" 27. *Toronto.* Lefroy.
" 29. *New York.* Hough.
" 30. *New Haven.* Herrick. Newton and Loomis.
" 30. *New York.* Hough.
" 30. *Montreal and Kingston.* Lefroy.
" 31. *Toronto?* Lefroy.
Apr. 1. *New Haven.* Herrick. Newton and Loomis.
" 1. *New York.* Hough.
" 1. *Quebec and Montreal.* Lefroy.
" 1. *Kingston, Toronto, and London.* Lefroy.
" 2. *New Haven.* Herrick. Newton and Loomis.
" 2. *New York.* Hough. *Worcester.* Chandler.
" 2. *Kingston, Toronto, and London.* Lefroy.
" 2. *Quebec and Montreal.* Lefroy. Jahn.
" 3. *New York.* Hough. *Quebec.* Lefroy.
" 4. *Kingston and Toronto.* Lefroy.
" 4. *Christiania.* Hansteen.
" 5. *Cambridge.* Bond. Lovering.
" 5. *New York.* Hough.
" 5. *Quebec and Montreal.* Lefroy.
" 5. *Kingston, Toronto, and London.* Lefroy.
" 5. *Christiania.* Hansteen.
" 6. *Cambridge.* Bond. Lovering.
" 6. *Boston.* Hale. Lovering.
" 6. *Worcester.* Chandler.
" 6. *New York.* Hough. *Providence.* Caswell.
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *Newberry.* Johnson. *Hobarton.* Sabine.
" 6. *Quebec and Montreal.* Lefroy.
" 6. *Kingston, Toronto, and London.* Lefroy.
" 6. *Aix-la-Chapelle.* Heis.[1] Jahn.
" 7. *New Haven.* Herrick. Newton and Loomis.

[1] Bull. de l'Acad. Brux. XVI. Pt. I. p. 4.

Apr. 7. *New York.* Hough.
" 7. *Quebec and Montreal.* Lefroy.
" 7. *Kingston, Toronto, and London.* Lefroy.
" 7. *Christiania.* Hansteen.
" 9. *Montreal and Kingston.* Lefroy.
" 15. *Cambridge.* Bond. Lovering.
" 15. *New York.* Hough. *Worcester.* Chandler.
" 15. *Montreal, Kingston, and Toronto.* Lefroy.
" 15. *Christiania.* Hansteen.
" 16. *Kingston.* Lefroy.
" 17. *Quebec.* Lefroy. *Christiania.* Hansteen.
" 17. *Makerstoun.* Broun.
" 20. *Quebec.* Lefroy.
" 21. *Kingston, Halifax, and Toronto.* Lefroy.
" 21. *Christiania.* Hansteen.
" 23. *Toronto and London.* Lefroy.
" 24. *Toronto.* Lefroy. *Inveresk.* Broun.[1]
" 26. *Quebec?* Lefroy.
" 29. *New Haven.* Herrick. Newton and Loomis.
" 29. *New York.* Hough. *Newberry.* Johnson.
" 29. *Quebec and Montreal.* Lefroy.
" 29. *Kingston, Toronto, and London.* Lefroy.
" 29. *Makerstoun.* Broun.
" 30. *New York.* Hough. *Newberry.* Johnson.
" 30. *Quebec and Montreal.* Lefroy.
" 30. *Kingston and Toronto.* Lefroy.
May 2. *Toronto.* Lefroy.
" 4. *Quebec.* Lefroy.
" 7. *Montreal, Kingston, and Toronto.* Lefroy.
" 8. *Quebec and Toronto.* Lefroy.
" 10. *Makerstoun.* Broun.
" 13. *New York.* Hough.
" 17. *Quebec and Toronto.* Lefroy.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 18. *New York.* Hough.
" 18. *Quebec and Kingston.* Lefroy.
" 18. *Makerstoun.* Broun.
" 22. *Kingston.* Lefroy.
" 24. *Worcester.* Chandler.
" 24. *Kingston, Toronto, and London.* Lefroy.
" 25. *Cambridge.* Bond. Lovering.
" 25. *Kingston and Toronto.* Lefroy.
" 26. *Toronto.* Lefroy.
" 27. *New Haven.* Herrick. Newton and Loomis.
" 31. *Cambridge.* Bond. Lovering.
" 31. *New Haven.* Herrick. Newton and Loomis.
" 31. *New York.* Hough. *Providence.* Caswell.
" 31. *Kingston, Toronto, and London.* Lefroy.

[1] Trans. Roy. Soc. Edinb. XIX. Pt. II. p. LXXIX.

June 1. *New York.* Hough.
" 3. *New York.* Hough.
" 3. *Montreal and Kingston.* Lefroy.
" 5. *Kingston.* Lefroy.
" 9. *Kingston.* Lefroy.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 22. *Toronto.* Lefroy.
" 28. *London, Canada West.* Lefroy.
" 29. *Quebec, Kingston, and Toronto.* Lefroy.
July 1. *Edinburgh.* Boué. *Inveresk.* Broun.
" 2. *Edinburgh.* Boué. *Inveresk.* Broun.
" 3. *New Haven.* Herrick. Newton and Loomis.
" 3. *New York.* Hough.
" 3. *Kingston, Toronto, and London.* Lefroy.
" 4. *New Haven.* Herrick. Newton and Loomis.
" 4. *New York.* Hough. *Worcester.* Chandler.
" 4. *Kingston and Toronto.* Lefroy.
" 5. *Kingston.* Lefroy.
" 7. *Cambridge.* Bond. Lovering.
" 10. *Quebec and Montreal.* Lefroy.
" 11. *Cambridge.* Bond. Lovering.
" 11. *Worcester.* Chandler.
" 11. *New Haven.* Herrick. Newton and Loomis.
" 11. *New York.* Hough. *Providence.* Caswell.
" 11. *Kingston and Toronto.* Lefroy.
" 12. *New York.* Hough.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *New York.* Hough. *Inveresk.* Broun.
" 24. *London, Canada West.* Lefroy.
" 27. *London, Canada West.* Lefroy.
" 28. *Kingston.* Lefroy.
" 29. *Kingston.* Lefroy.
Aug. 1. *Montreal and Kingston.* Lefroy.
" 3. *Montreal.* Lefroy.
" 6. *Christiania.* Hansteen.
" 8. *New Haven.* Herrick. Newton and Loomis.
" 8. *New York.* Hough. *Toronto.* Lefroy.
" 8. *Quebec, Montreal, and Kingston.* Lefroy.
" 8. *Christiania.* Hansteen. *Inveresk.* Broun.
" 9. *New York.* Hough.
" 14. *New York.* Hough.
" 17. *Franconia, N. H.* Hough.
" 19. *Portsmouth, England.* Hough.
" 20. *New York.* Hough.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *New York.* Hough. *Newberry.* Johnson.
" 21. *Quebec and Montreal.* Lefroy.
" 21. *Kingston, Toronto, and London.* Lefroy.
" 21. *Christiania.* Hansteen.
" 22. *New Haven.* Herrick. Newton and Loomis.

Aug. 22. *Quebec, Montreal, and London.* Lefroy.
" 28. *Toronto.* Lefroy.
" 29. *Christiania.* Hansteen.
" 31. *Christiania.* Hansteen.
Sept. 3. *New Haven.* Herrick. Newton and Loomis.
" 3. *Quebec and Kingston.* Lefroy.
" 4. *Newberry.* Johnson. *Toronto.* Lefroy.
" 4. *Quebec, Montreal, and Kingston.* Lefroy.
" 4. *Christiania.* Hansteen.
" 5. *Makerstoun.* Broun.
" 9. *New York.* Hough.
" 12. *Russia.* Hough.
" 13. *Russia.* Hough.
" 17. *Kingston.* Lefroy. *Christiania.* Hansteen.
" 18. *Quebec and Kingston.* Lefroy.
" 18. *Christiania.* Hansteen.
" 19. *Christiania.* Hansteen.
" 20. *Toronto.* Lefroy.
" 29. *Toronto.* Lefroy.
" 30. *Toronto.* Lefroy.
Oct. 1. *Fort Confidence, Gr. Br. Lake.* Richardson.[1]
" 2. *Quebec.* Lefroy.
" 4. *Quebec.* Lefroy.
" 5. *New York.* Hough.
" 6. *Cambridge?* Bond.[2] Lovering.
" 8. *New York.* Hough. *Toronto.* Lefroy.
" 8. *Quebec, Montreal, and Kingston.* Lefroy.
" 10. *New York.* Hough.
" 13. *Fort Confidence.* Richardson.
" 17. *New Haven and Virginia.* Hough.
" 17. *Toronto.* Lefroy. *England.* Hough.
" 17. *Fort Confidence.* Richardson.
" 18. *Toronto.* Lefroy. *Virginia.* Hough.
" 18. *Fort Confidence.* Richardson.
" 18. *Prestwich.* Sturgeon.[3] *Dunse.* Stevenson.
" 18. *Stonyhurst.* Weld.[4]
" 18. *Gorki.* Kupffer. *Spain.* Rico.[5]
" 18. *Kremsominster.* Littrow. Arago.
" 18. *Christiania.* Hansteen. *Koursk.* Kupffer.
" 18. *Makerstoun.* Broun. *Hobarton.* Sabine.
" 19. *Worcester.* Chandler.
" 19. *London, Canada West.* Lefroy.
" 19. *Stonyhurst.* Weld. ——— Schmidt. Jahn.
" 19. *Christiania.* Hansteen. *Yakoutsk.* Kupffer.

[1] Magnet. and Meteor. Observ. at Lake Athabasca, &c. p. 329.
[2] New York Tribune of Oct. 10.
[3] Edin. New Phil. Journ. XLVII. 148.
[4] Phil. Mag. Third Series, XXXIII. 376.
[5] Mem. Acad. Cienc. Madrid, III. 77.

Oct. 19. *Makerstoun.* Broun.
" 19. *Fort Confidence.* Richardson.
" 20. *Stonyhurst.* Weld. *Christiania.* Hansteen.
" 20. *Makerstoun.* Broun.
" 20. *Fort Confidence.* Richardson.
" 21. *England.* Hough. *Christiania.* Hansteen.
" 21. *Makerstoun.* Broun.
" 21. *Fort Confidence.* Richardson.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 22. *New York.* Hough.
" 22. *Kingston, Toronto, and London.* Lefroy.
" 23. *Makerstoun.* Broun. ——— Schmidt. Jahn.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *Providence, Rhode Island.* Caswell.
" 23. *New York.* Hough. *Newberry.* Johnson.
" 23. *Montreal, Toronto, and Kingston.* Lefroy.
" 23. *Aix-la-Chapelle.* Heis. —— Schmidt. Jahn.
" 23. *Koursk.* Kupffer. *Christiania.* Hansteen.
" 23. *Fort Confidence.* Richardson.
" 24. *Toronto.* Lefroy. ——— Schmidt.
" 24. *Fort Confidence.* Richardson.
" 24. *Paris.* De la Pylaie. Jahn.
" 24. *Aix-la-Chapelle.* Heis.
" 24. *Makerstoun.* Broun.
" 25. *Cambridge.* Bond. Lovering.
" 25. *Providence.* Caswell.
" 25. *New Haven.* Herrick. Newton and Loomis.
" 25. *New York.* Hough. *Newberry.* Johnson.
" 25. *Quebec and Toronto.* Lefroy.
" 25. *Aix-la-Chapelle.* Heis. —— Schmidt. Jahn.
" 25. *Fort Confidence.* Richardson. *Koursk.* Kupffer.
" 26. *New Haven.* Herrick. Newton and Loomis.
" 26. *Fort Confidence.* Richardson.
" 26. *Aix-la-Chapelle.* Heis. —— Schmidt. Jahn.
" 26. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 27. *Newberry.* Johnson. *Quebec.* Lefroy.
" 27. *Fort Confidence.* Richardson.
" 27. *Prestwich.* Sturgeon. *Jakobshavn.* Rudolph.
" 28. *Newberry.* Johnson. *Quebec.* Lefroy.
" 28. *Fort Confidence.* Richardson. —— Schmidt.
" 29. *Kingston.* Lefroy.
" 30. *New York.* Hough.
" 30. *Quebec.* Lefroy. ——— Schmidt.
" 30. *Fort Confidence.* Richardson.
" 31. *Kingston and Toronto.* Lefroy.
Nov. 1. *Fort Confidence.* Richardson.
" 1. *Jakobshavn.* Rudolph.
" 2. *Newberry.* Johnson.
" 2. *Fort Confidence.* Richardson.
" 3. *Fort Confidence.* Richardson.

Nov. 4. *Fort Confidence.* Richardson.
" 5. *Fort Confidence.* Richardson.
" 6. *Fort Confidence.* Richardson.
" 7. *Fort Confidence.* Richardson.
" 9. *Fort Confidence.* Richardson. *Tobolsk.* Kupffer.[1]
" 10. *Toronto.* Lefroy. *Tobolsk.* Kupffer.
" 10. *Fort Confidence.* Richardson.
" 11. *Fort Confidence.* Richardson.
" 14. *Fort Confidence.* Richardson.
" 14. *Cracow.* Boué.[2]
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *Fort Confidence.* Richardson.
" 15. *Toronto.* Lefroy.
" 16. *Toronto.* Lefroy. *Christiania.* Hansteen.
" 17. *Cambridge.* Bond. Lovering.
" 17. *New Haven.* Herrick. Newton and Loomis.[3]
" 17. *Maine.* Herrick. Newton and Loomis.
" 17. *New York.* Hough. *Newberry.* Johnson.
" 17. *Toronto, Montreal, and Kingston.* Lefroy.
" 17. *Quebec, London, Penetanguishene.* Lefroy.
" 17. *Fort Confidence.* Richardson.
" 17. *California. Cuba.* Poey.[4]
" 17. *Prestwich.* Sturgeon. *Northampton.* Watkins.[5]
" 17. *Brussels.* Quetelet. Arago. *Gorki.* Kupffer.
" 17. *Makerstoun.* Broun. *Dunse.* Stevenson.
" 17. *Aix-la-Chapelle.* Heis. *Alsen.* Brorsen. Jahn.
" 17. *Italy, Greece, Asia. Spain.* Rico.
" 17. *Barnaoul and Lougan.* Kupffer.
" 17. *Catharinebourg and Koursk.* Kupffer.[6]
" 17. *Bogoslowski and Lougan.* Kupffer.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 18. *Worcester.* Chandler. *New York.* Hough.
" 18. *Quebec and Toronto.* Lefroy.
" 18. *Fort Confidence.* Richardson.
" 18. *Makerstoun.* Broun.
" 18. *Aix-la-Chapelle.* Heis. Jahn.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *Quebec and Toronto.* Lefroy.
" 19. *Yakoutsk.* Kupffer.
" 19. *Christiania.* Hansteen. ——— Schmidt.
" 19. *Hobarton, V. D. Land.* Sabine.
" 20. *Fort Confidence.* Richardson.

[1] Annal. de l'Observ. Phys. Centrale de Russie, 1859, Suppl. p. 170.
[2] Kreil's Jahrbuch fur Prag, I. 312.
[3] Amer. Journ. Sci. Second Series, VII. 127.
[4] Amer. Journ. Sci. Second Series, VII. 127.
[5] Phil. Mag. Third Series, XXXV. 69.
[6] Annal. de l'Observ. Phys. Centrale de Russie, 1848, pp. 147, 213, 517 and 581.

Nov. 21. *Cambridge.* Bond. Lovering.
" 21. *Worcester.* Chandler. *Providence.* Caswell.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *New York.* Hough. *Yakoutsk.* Kupffer.
" 21. *Toronto and London, C. W.* Lefroy.
" 21. *Fort Confidence.* Richardson.
" 21. *Makerstoun.* Broun. *Dunse.* Stevenson.
" 21. *Brussels.* Quetelet. *Prestwich.* Sturgeon.
" 21. *Aix-la-Chapelle.* Heis. —— Schmidt. Jahn.
" 22. *Cambridge.* Bond. Lovering.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 22. *Quebec and Toronto.* Lefroy.
" 22. *Aix-la-Chapelle.* Heis. —— Schmidt. Jahn.
" 22. *Makerstoun.* Broun. *Russia?* Hough.
" 22. *Jakobshavn.* Rudolph.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *New York.* Hough.
" 23. *Quebec and Kingston.* Lefroy.
" 23. *Toronto and Penetanguishene.* Lefroy.
" 24. *Christiania.* Hansteen.
" 24. *Fort Confidence.* Richardson.
" 25. *New Haven.* Herrick. Newton and Loomis.
" 25. *Toronto?* Lefroy. *Tobolsk.* Kupffer.
" 25. *Fort Confidence.* Richardson.
" 25. *Jakobshavn.* Rudolph.
" 26. *New Haven.* Herrick. Newton and Loomis.
" 26. *Providence.* Caswell. *New York.* Hough.
" 26. *Kingston, Toronto, and London.* Lefroy.
" 26. *Newfoundland and Quebec.* Lefroy.
" 26. *Fort Confidence.* Richardson.
" 26. *Jakobshavn.* Rudolph.
" 27. *New Haven.* Herrick. Newton and Loomis.
" 27. *New York.* Hough.
" 27. *Newfoundland and Toronto.* Lefroy.
" 27. *Fort Confidence.* Richardson.
" 27. *Christiania.* Hansteen.
" 28. *Worcester.* Chandler.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *Fort Confidence.* Richardson.
" 29. *New Haven?* Herrick. Newton and Loomis.
" 29. *Fort Confidence.* Richardson.
" 30. *Montreal.* Lefroy. *Makerstoun.* Broun.
" 30. *Fort Confidence.* Richardson.
Dec. 1. *New Haven.* Herrick. Newton and Loomis.
" 1. *Fort Confidence.* Richardson.
" 2. *Newfoundland.* Lefroy.
" 2. *Fort Confidence.* Richardson.
" 3. *Fort Confidence.* Richardson.
" 3. *Jakobshavn.* Rudolph.

Dec. 4. *Fort Confidence.* Richardson.
" 5. *Fort Confidence.* Richardson.
" 7. *Fort Confidence.* Richardson.
" 8. *Kingston.* Lefroy.
" 8. *Fort Confidence.* Richardson.
" 9. *Fort Confidence.* Richardson.
" 10. *Fort Confidence.* Richardson.
" 12. *New York.* Hough.
" 12. *Fort Confidence.* Richardson.
" 13. *Newfoundland.* Lefroy.
" 13. *Aix-la-Chapelle.* Heis. Jahn.
" 13. *Fort Confidence.* Richardson.
" 14. *Newfoundland.* Lefroy.
" 14. *Fort Confidence.* Richardson.
" 16. *New Haven.* Bradley. Newton and Loomis.
" 16. *Fort Confidence.* Richardson.
" 17. *New Haven.* Herrick. Newton and Loomis.
" 17. *Providence.* Caswell. *New York.* Hough.
" 17. *Quebec and Kingston.* Lefroy.
" 17. *Toronto and London.* Lefroy.
" 17. *Fort Confidence.* Richardson.
" 17. *Prestwich.* Sturgeon. *Dunse.* Stevenson.
" 17. *Leipsic.* Jahn.
" 17. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 18. *Toronto and London.* Lefroy.
" 18. *Newfoundland and Kingston.* Lefroy.
" 18. *Fort Confidence.* Richardson.
" 19. *Quebec and London.* Lefroy.
" 19. *Fort Confidence.* Richardson.
" 20. *Fort Confidence.* Richardson.
" 21. *Newfoundland.* Lefroy.
" 21. *Fort Confidence.* Richardson.
" 21. *Makerstoun.* Broun. *Hobarton.* Sabine.
" 22. *Kingston.* Lefroy.
" 22. *Fort Confidence.* Richardson.
" 22. *Christiania.* Hansteen.
" 23. *Cambridge.* Bond. Lovering.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *Providence.* Caswell. *New York.* Hough.
" 23. *Newberry.* Johnson.
" 23. *Newfoundland and Penetanguishene.* Lefroy.
" 23. *Fort Confidence.* Richardson.
" 23. *Christiania.* Hansteen.
" 24. *Christiania.* Hansteen.
" 25. *Newfoundland.* Lefroy.
" 25. *Fort Confidence.* Richardson.
" 25. *Christiania.* Hansteen.
" 26. *Worcester.* Chandler. *New York.* Hough.
Dec. 26. *New Haven.* Herrick. Newton and Loomis.
" 26. *Montreal and Kingston.* Lefroy.
" 26. *Newfoundland and Quebec.* Lefroy.
" 26. *Fort Confidence.* Richardson.
" 26. *Jakobshavn.* Rudolph.
" 27. *New York.* Hough.
" 27. *Fort Confidence.* Richardson.
" 28. *Fort Confidence.* Richardson.
" 29. *Fort Confidence.* Richardson.
" 30. *Fort Confidence.* Richardson.
" 31. *Fort Confidence.* Richardson.
" 31. *Jakobshavn.* Rudolph.

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Jan. 4. *England.* Hough. *Fort Confidence.* Richardson.
" 5. *Makerstoun.* Broun.
" 7. *Newfoundland and Quebec.* Lefroy.
" 10. *Fort Confidence.* Richardson.
" 11. *Quebec.* Lefroy.
" 11. *Fort Confidence.* Richardson.
" 11. *Christiania.* Hansteen.
" 14. *Providence, R. I.* Caswell.
" 14. *New Haven?* Bradley. Newton and Loomis.
" 14. *New York.* Hough. *Newberry.* Johnson.
" 14. *Kingston, Toronto, and Halifax.* Lefroy.
" 14. *Newfoundland and Quebec.* Lefroy.
" 14. *Fort Confidence.* Richardson.
" 14. *Prestwich.* Sturgeon. *Christiania.* Hansteen.
" 14. *Makerstoun.* Broun. *Paris.* Hough.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 15. *New York.* Hough.
" 15. *Fort Confidence.* Richardson.
" 15. *Christiania.* Hansteen.
" 15. *Makerstoun.* Broun.
" 16. *Makerstoun.* Broun.
" 16. *Fort Confidence.* Richardson.
" 17. *Penetanguishene.* Lefroy.
" 17. *Fort Confidence.* Lefroy.
" 19. *Fort Confidence.* Richardson.
" 20. *Christiania.* Hansteen.
" 20. *Fort Confidence.* Richardson.
" 22. *New York.* Hough. *Toronto.* Lefroy.
" 22. *Fort Confidence.* Richardson.
" 23. *Newfoundland.* Lefroy.
" 23. *Fort Confidence.* Richardson.
" 24. *Fort Confidence.* Richardson.
" 25. *Newfoundland.* Lefroy.
" 25. *Makerstoun.* Broun.

Jan. 26. *Toronto.* Lefroy.
" 26. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.
" 26. *Makerstoun.* Broun.
" 27. *Fort Confidence.* Richardson.
" 27. *Smeena.* Boué.[1]
" 28. *Fort Confidence.* Richardson.
" 30. *New York.* Hough.
" 30. *Fort Confidence.* Richardson.
" 31. *Makerstoun.* Broun.
Feb. 1. *Fort Confidence.* Richardson.
" 2. *Fort Confidence.* Richardson.
" 3. *Quebec.* Lefroy.
" 9. *Quebec.* Lefroy.
" 10. *Fort Confidence.* Richardson.
" 11. *Fort Confidence.* Richardson.
" 11. *Christiania.* Hansteen.
" 11. *Makerstoun.* Broun.
" 12. *Quebec and Montreal.* Lefroy.
" 12. *Fort Confidence.* Richardson.
" 12. *Christiania.* Hansteen.
" 13. *New Haven.* Herrick. Newton and Loomis.
" 13. *New York.* Hough. *Newberry.* Johnson.
" 13. *Quebec, Toronto, and Halifax.* Lefroy.
" 13. *Fort Confidence.* Richardson.
" 13. *Makerstoun.* Broun.
" 14. *Toronto.* Lefroy.
" 15. *Quebec and Penetanguishene.* Lefroy.
" 15. *Montreal and Newfoundland.* Lefroy.
" 16. *New Haven.* Herrick. Newton and Loomis.
" 16. *Providence.* Caswell. *New York.* Hough.
" 16. *Toronto and London, C. W.* Lefroy.
" 16. *Newfoundland and Quebec.* Lefroy.
" 16. *Fort Confidence.* Richardson.
" 17. *New York.* Hough.
" 17. *Penetanguishene.* Lefroy.
" 17. *Fort Confidence.* Richardson.
" 18. *New Haven?* Bradley. Newton and Loomis.
" 18. *New York.* Hough. *Newberry.* Johnson.
" 18. *Quebec, Kingston, and Toronto.* Lefroy.
" 18. *London and Penetanguishene.* Lefroy.
" 18. *England.* Hough. *Christiania.* Hansteen.
" 18. *Makerstoun.* Broun.
" 19. *Cambridge.* Bond. Lovering.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *New York.* Hough. *Providence.* Caswell.
" 19. *Newberry.* Johnson. *Newfoundland.* Lefroy.
" 19. *Quebec, Toronto, and Halifax.* Lefroy.

[1] Kreil's Jahrbuch fur Prag. I. 415.

Feb. 19. *Fort Confidence.* Richardson.
" 19. *Prestwich.* Sturgeon. *Dunse.* Stevenson.
" 19. *Makerstoun.* Broun. *Leipsic.* Jahn.
" 20. *Quebec and Halifax.* Lefroy.
" 20. *Newfoundland.* Lefroy. *Tobolsk.* Kupffer.
" 20. *Fort Confidence.* Richardson.
" 20. *Christiania.* Hansteen. *Dunse.* Stevenson.
" 20. *Makerstoun.* Broun. *Leipsic.* Jahn.
" 21. *New York.* Hough. *Newberry.* Johnson.
" 21. *Quebec and Halifax.* Lefroy.
" 21. *Fort Confidence.* Richardson.
" 21. *Christiania.* Hansteen.
" 21. *Makerstoun.* Broun. *Leipsic.* Jahn.
" 22. *Newfoundland.* Lefroy. *Koursk.* Kupffer.
" 22. *Bonn.* Schmidt. *Oxford.* Slatter.[1]
" 22. *Brussels.* Quetelet. *Christiania.* Hansteen.
" 22. *Makerstoun.* Broun. *Leipsic.* Jahn.
" 23. *Newfoundland.* Lefroy.
" 23. *Fort Confidence.* Richardson.
" 23. *Christiania.* Hansteen.
" 24. *Makerstoun.* Broun.
" 24. *Fort Confidence.* Richardson.
" 25. *Quebec.* Lefroy.
" 25. *Fort Confidence.* Richardson. —— Schmidt.
" 26. *Toronto and Penetanguishene.* Lefroy.
" 26. *Newfoundland and Kingston.* Lefroy.
" 26. *Fort Confidence.* Richardson.
" 26. *Aix-la-Chapelle.* Heis.[2]
" 26. *Makerstoun.* Broun.
" 27. *Montreal, Kingston, and Toronto.* Lefroy.
" 27. *Halifax and Penetanguishene.* Lefroy.
" 27. *Newfoundland, Quebec, and London.* Lefroy.
" 27. *Fort Confidence.* Richardson.
" 27. *Brussels.* Quetelet. *Leipsic.* Jahn. Schmidt.
" 27. *Aix-la-Chapelle.* Heis. *Pegau.* Kuhn. Jahn.
" 28. *New York.* Hough. *Makerstoun.* Broun.
Mar. 1. *Fort Confidence.* Richardson.
" 3. *Fort Confidence.* Richardson.
" 6. *Quebec.* Lefroy.
" 6. *Fort Confidence.* Richardson.
" 8. *Fort Confidence.* Richardson.
" 9. *London, C. W.* Lefroy.
" 11. *Fort Confidence.* Richardson.
" 12. *Christiania.* Hansteen.
" 12. *Fort Confidence.* Richardson.
" 14. *New York.* Hough. *Illinois.*
" 14. *Fort Confidence.* Richardson.

[1] Phil. Mag. Third Series, XXXV. 71.
[2] Bull. de l'Acad. Brux. XVIII. Pt. II. p. 47.

Mar. 15. *Kingston.* Lefroy.
" 15. *Fort Confidence.* Richardson.
" 16. *Aix-la-Chapelle.* Heis.
" 17. *Cambridge.* Bond. Lovering.
" 17. *Worcester.* Chandler.[1] *New York.* Hough.
" 17. *Kingston, Toronto, and London.* Lefroy.
" 17. *Halifax, Bruce Mines, Lake Huron.* Lefroy.
" 17. *Newfoundland and Quebec.* Lefroy.
" 17. *Fort Confidence.* Richardson.
" 17. *Christiania.* Hansteen.
" 18. *Worcester, Mass.* Chandler.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 18. *Providence.* Caswell. *New York.* Hough.
" 18. *Quebec, Montreal, and Kingston.* Lefroy.
" 18. *Toronto, London, and Bruce Mines.* Lefroy.
" 18. *Fort Confidence.* Richardson.
" 18. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 19. *Worcester. Chandler. New York.* Hough.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *Fort Confidence.* Richardson.
" 19. *Makerstoun.* Broun.
" 20. *New York.* Hough.
" 20. *Fort Confidence.* Richardson.
" 20. *Christiania.* Hansteen.
" 21. *Toronto.* Lefroy.
" 21. *Fort Confidence.* Richardson.
" 22. *Fort Confidence.* Richardson.
" 24. *Fort Confidence.* Richardson.
" 25. *New York.* Hough.
" 25. *Toronto and Halifax.* Lefroy.
" 25. *Fort Confidence.* Richardson.
" 25. *Christiania.* Hansteen.
" 26. *Toronto and London.* Lefroy.
" 26. *Fort Confidence.* Richardson.
" 27. *New York.* Hough. *Toronto.* Lefroy.
" 28. *Christiania.* Hansteen.
" 30. *New York.* Hough.
" 30. *Toronto and London, C. W.* Lefroy.
" 30. *Newfoundland and Kingston.* Lefroy.
" 30. *Fort Confidence.* Richardson.
" 31. *Toronto.* Lefroy.
Apr. 1. *New Haven.* Bradley. Newton and Loomis.
" 1. *Toronto and Halifax.* Lefroy.
" 2. *New York.* Hough.
" 2. *Quebec, Montreal, and London.* Lefroy.
" 4. *Halifax.* Lefroy.
" 4. *Fort Confidence.* Richardson.
" 8. *Fort Confidence.* Richardson.

[1] Seventeenth Report of the Lunatic Asylum, p. 68.

Apr. 11. *Kingston.* Lefroy.
" 12. *Christiania.* Hansteen.
" 13. *New York.* Hough.
" 13. *Montreal, Toronto, and Halifax.* Lefroy.
" 13. *Fort Confidence.* Richardson.
" 13. *Christiania.* Hansteen.
" 14. *Quebec.* Lefroy.
" 14. *Fort Confidence.* Richardson.
" 14. *Christiania.* Hansteen.
" 15. *Newfoundland.* Lefroy.
" 15. *Fort Confidence.* Richardson.
" 15. *Christiania.* Hansteen.
" 16. *New York.* Hough.
" 16. *Toronto, London, and Halifax.* Lefroy.
" 16. *Makerstoun.* Broun. *Christiania.* Hansteen.
" 17. *Worcester.* Chandler. *New York.* Hough.
" 17. *Montreal and Halifax.* Lefroy.
" 17. *Newfoundland and Quebec.* Lefroy.
" 17. *Makerstoun.* Broun.
" 18. *Quebec and Montreal.* Lefroy.
" 18. *Newfoundland.* Lefroy.
" 18. *Fort Confidence.* Richardson.
" 19. *New York.* Hough.
" 20. *New York.* Hough.
" 20. *Toronto and Halifax.* Lefroy.
" 20. *Newfoundland.* Lefroy.
" 21. *Quebec and Halifax.* Lefroy.
" 21. *Fort Confidence.* Richardson.
" 22. *Newfoundland and Toronto.* Lefroy.
" 24. *Kingston and London.* Lefroy.
" 24. *Newfoundland and Montreal.* Lefroy.
" 25. *New York.* Hough.
" 25. *Newfoundland.* Lefroy.
" 26. *Newfoundland.* Lefroy.
" 27. *Newfoundland and Quebec.* Lefroy.
" 28. *London, C. W.* Lefroy.
" 29. *Halifax ? and Quebec.* Lefroy.
" 30. *New York.* Hough.
" 30. *Newfoundland.* Lefroy.
May 1. *Quebec and Halifax.* Lefroy.
" 6. *Halifax.* Lefroy.
" 11. *Newfoundland and Halifax.* Lefroy.
" 12. *Cambridge.* Bond. Lovering.
" 12. *Newberry.* Johnson.
" 14. *Toronto and London.* Lefroy.
" 17. *Halifax and Toronto.* Lefroy.
" 20. *Toronto.* Lefroy.
" 21. *Toronto.* Lefroy.
" 23. *Toronto ?* Lefroy.
" 25. *Kingston and Toronto.* Lefroy.

May 26. *Kingston.* Lefroy.
" 27. *Montreal.* Lefroy.
June 5. *Dorpat.* Mädler. Jahn.
" 6. *Quebec.* Lefroy.
" 8. *Kingston.* Lefroy.
" 10. *New York.* Hough.
" 12. *New Haven.* Herrick. Newton and Loomis.
" 14. *New York.* Hough. *Quebec.* Lefroy.
" 16. *Quebec?* Lefroy.
" 17. *New York.* Hough. *Montreal.* Lefroy.
" 18. *Montreal.* Lefroy.
" 19. *New York.* Hough.
" 20. *Toronto and London.* Lefroy.
" 20. *Newfoundland and Quebec.* Lefroy.
" 22. *Toronto.* Lefroy.
" 24. *Kingston and London.* Lefroy.
" 25. *Halifax?* Lefroy.
" 26. *Warren Centre, Connecticut.* Hough.
" 27. *Quebec.* Lefroy.
" 29. *New York.* Hough.
July 3. *Halifax.* Lefroy.
" 4. *Halifax.* Lefroy.
" 5. *Toronto.* Lefroy.
" 9. *New York.* Hough.
" 9. *Newfoundland and Toronto.* Lefroy.
" 10. *Toronto.* Lefroy.
" 12. *New Haven.* Herrick. Newton and Loomis.
" 12. *New York.* Hough. *London, C. W.* Lefroy.
" 13. *Cambridge.* Bond. Lovering.
" 14. *New York.* Hough.
" 20. *Toronto.* Lefroy.
" 21. *Newfoundland.* Lefroy.
" 22. *New York.* Hough.
" 22. *Quebec and Toronto.* Lefroy.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *New York.* Hough.
" 23. *Montreal, Kingston, and Toronto.* Lefroy.
" 23. *Newfoundland and Quebec.* Lefroy.
" 23. *Halifax and London, C. W.* Lefroy.
" 24. *New York.* Hough.
" 26. *Toronto.* Lefroy.
" 31. *Montreal and Quebec.* Lefroy.
" 31. *Kingston, Toronto, and London.* Lefroy.
" 31. *Newfoundland.* Lefroy.
" 31. *Christiania.* Hansteen.
Aug. 2. *Toronto.* Lefroy.
" 4. *Newfoundland and Kingston.* Lefroy.
" 12. *New York.* Hough.
" 12. *Fenelon Falls and London.* Lefroy.
" 12. *Newfoundland and Toronto.* Lefroy.
Aug. 13. *New York.* Hough.
" 13. *Middlebury, Vt.* Herrick. Newton and Loomis.
" 13. *Kingston and Newfoundland.* Lefroy.
" 13. *Montreal.* McGinn. Lefroy.[1]
" 17. *New York.* Hough.
" 18. *New York.* Hough.
" 18. *Toronto and London.* Lefroy.
" 20. *Newfoundland.* Lefroy.
" 21. *Kingston and Toronto.* Lefroy.
" 22. *Halifax and Quebec.* Lefroy.
" 27. *New York.* Hough.
" 28. *New York.* Hough.
Sept. 3. *Quebec.* Lefroy.
" 6. *New York.* Hough. *Christiania.* Hansteen.
" 6. *Fort Macpherson.* Hooper.
" 7. *New Haven.* Herrick. Newton and Loomis.
" 7. *New York.* Hough.
" 7. *Newfoundland and Toronto.* Lefroy.
" 7. *Fort Macpherson.* Hooper.
" 8. *New York.* Hough. *Newberry.* Johnson.
" 8. *Kingston, Toronto, and London.* Lefroy.
" 9. *New Haven.* Herrick. Newton and Loomis.
" 9. *New York.* Hough. *Montreal.* Lefroy.
" 12. *New York.* Hough. *Providence.* Caswell.
" 12. *Pittsfield.* Herrick. Newton and Loomis.
" 12. *Near Portland.* Herrick. Newton and Loomis.
" 12. *Newfoundland and Kingston.* Lefroy.
" 12. *Halifax and Toronto.* Lefroy.
" 12. *Fort Macpherson.* Hooper. *Sitka.* Kupffer.[2]
" 13. *New York.* Hough.
" 16. *New Haven.* Herrick. Newton and Loomis.
" 16. *New York.* Hough.
" 16. *Newfoundland and Montreal.* Lefroy.
" 16. *Fort Macpherson.* Hooper.
" 17. *New York.* Hough.
" 17. *Fenelon Falls and Toronto.* Lefroy.
" 17. *Fort Macpherson.* Hooper.
" 17. *Makerstoun.* Broun.
" 18. *Worcester.* Chandler. *Newberry.* Johnson.
" 18. *Providence.* Caswell. *New York.* Hough.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 18. *Montreal, Kingston, and Toronto.* Lefroy.
" 18. *Halifax and Fenelon Falls.* Lefroy.
" 18. *Newfoundland and Quebec.* Lefroy.
" 18. *Makerstoun.* Broun.
" 19. *New York.* Hough.
" 19. *Quebec and Montreal.* Lefroy.

[1] Phil. Mag. Third Series, XXXVI. 545.
[2] Annal. de l'Observ. Phys. Centrale de Russie, 1849, p. 377.

Sept. 19. *Halifax and Fenelon Falls.* Lefroy.
" 19. *Fort Macpherson.* Hooper.
" 19. *Makerstoun.* Broun.
" 20. *New York.* Hough.
" 21. *Halifax.* Lefroy.
" 23. *New York.* Hough. *Christiania.* Hansteen.
" 24. *Kingston and Toronto.* Lefroy.
" 24. *Christiania.* Hansteen.
" 25. *Jakobshavn.* Rudolph.
" 27. *Newberry.* Johnson. ——— Schmidt.
" 27. *Fort Good Hope.* Hooper.
" 27. *Jakobshavn.* Rudolph.
" 29. *Montreal and Kingston.* Lefroy.
" 29. *Newfoundland and Quebec.* Lefroy.
" 29. *Dunse.* Stevenson.
Oct. 1. *New York.* Hough. *England.* Hough.
" 4. *New York.* Hough.
" 7. *Montreal and Kingston.* Lefroy.
" 7. *Toronto and London.* Lefroy.
" 7. *Newfoundland and Quebec.* Lefroy.
" 9. *Montreal.* Lefroy.
" 10. *Toronto.* Lefroy. *Christiania.* Hansteen.
" 13. *New York.* Hough. *Providence.* Caswell.
" 13. *New Haven?* Herrick. Newton and Loomis.
" 13. *Newberry.* Johnson. *Quebec.* Lefroy.
" 13. *Kingston, Toronto, and London.* Lefroy.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *Newberry.* Johnson. *Providence.* Caswell.
" 14. *New York.* Hough.
" 14. *Quebec, Montreal, and Toronto.* Lefroy.
" 14. *Halifax and London, C. W.* Lefroy.
" 14. *Christiania.* Hansteen. *Makerstoun.* Broun.
" 15. *Newberry.* Johnson. *Cambridge.* Glaisher.[1]
" 15. *Christiania.* Hansteen.
" 16. *Fort Norman.* Hooper.[2]
" 17. *Newfoundland and Kingston.* Lefroy.
" 17. *Christiania.* Hansteen.
" 18. *New York.* Hough. *Newberry.* Johnson.
" 18. *Kingston and Toronto.* Lefroy.
" 18. *Halifax and London, C. W.* Lefroy.
" 18. *Makerstoun.* Broun.
" 19. *New York.* Hough.
" 19. *Halifax and Kingston.* Lefroy.
" 20. *New York.* Hough. *Kingston.* Lefroy.
" 21. *Newfoundland.* Lefroy.
" 22. *Aix-la-Chapelle.* Heis. Jahn.
" 22. *Leipsic.* Jahn. ——— Schmidt.

[1] Phil. Mag. Third Series, XXXVI. p. 116.
[2] Journal of Proceedings, &c. 156.

Oct. 22. *Fort Norman.* Hooper. *Jakobshavn.* Rudolph.
" 22. *Greenwich, Engl.*[1] *Christiania.* Hansteen.
" 23. *New York.* Hough. *Fort Norman.* Hooper.
" 23. *Christiania.* Hansteen. ——— Schmidt.
" 24. *Montreal and Toronto.* Lefroy.
" 24. *Dunse.* Stevenson. *Brussels.* Quetelet.
" 24. ——— Schmidt. *Jakobshavn.* Rudolph.
" 25. *New York.* Hough. *Fort Norman.* Hooper.
" 26. *Fort Norman.* Hooper.
" 29. *Fort Norman.* Hooper.
" 30. *New York.* Hough.
" 30. *Toronto? and London.* Lefroy.
" 30. *Newfoundland and Quebec.* Lefroy.
" 31. *Fort Norman.* Hooper.
Nov. 3. *Fort Norman.* Hooper.
" 5. *Senftenberg.*[2] ——— Schmidt.
" 5. *Jakobshavn.* Rudolph.
" 9. *Brussels.* Quetelet.
" 10. *Newfoundland.* Lefroy.
" 12. *New Haven.* Herrick. Newton and Loomis.
" 12. *Toronto and Kingston.* Lefroy.
" 12. *Fort Norman.* Hooper.
" 13. *Toronto.* Lefroy. *Fort Norman.* Hooper.
" 14. *Kingston and Toronto.* Lefroy.
" 14. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.
" 15. *New York.* Hough. *Fenelon Falls.* Lefroy.
" 17. *Jakobshavn.* Rudolph.
" 18. *Kingston and Toronto.* Lefroy.
" 19. *Toronto?* Lefroy. *Christiania.* Hansteen.
" 19. *Dunse.* Stevenson. ——— Schmidt.
" 20. *Fort Franklin.* Hooper.
" 20. *Christiania.* Hansteen.
" 21. *Toronto.* Lefroy. *Fort Franklin.* Hooper.
" 25. *Toronto?* Lefroy.
" 26. *Quebec and Toronto.* Lefroy. *Sitka.* Kupffer.
" 27. *Providence.* Caswell. *Kingston.* Lefroy.
" 27. *Christiania.* Hansteen. *Sitka.* Kupffer.
" 28. *Newberry.* Johnson.
" 28. *Montreal and Toronto.* Lefroy.
" 28. *Newfoundland and Quebec.* Lefroy.
Dec. 1. *Jakobshavn.* Rudolph.
" 4. *Fort Franklin.* Hooper.
" 5. *Fort Franklin.* Hooper.
" 7. *New Haven?* Herrick. Newton and Loomis.
" 7. *New York.* Hough. *Fort Franklin.* Hooper.
" 7. *Jakobshavn.* Rudolph.
" 8. *New York.* Hough. *Fort Franklin.* Hooper.

[1] Phil. Mag. Third Series, XXXVI. 116.
[2] Kreil's Jahrbuch fur Prag. I. 415.

Dec. 9. *Fort Franklin.* Hooper.
" 10. *Christiania.* Hansteen.
" 11. *Montreal and Toronto.* Lefroy.
" 11. *Fort Franklin.* Hooper.
" 11. *Christiania.* Hansteen.
" 12. *Newfoundland and Toronto.* Lefroy.
" 12. *Fort Franklin.* Hooper.
" 12. *Christiania.* Hansteen. *Sitka.* Kupffer.
" 13. *Fort Franklin.* Hooper.
" 17. *New Haven?* Herrick. Newton and Loomis.
" 17. *New York.* Hough. *Fort Franklin.* Hooper.
" 18. *New York.* Hough. *Toronto.* Lefroy.
" 18. *Fort Franklin.* Hooper.
" 18. *Jakobshavn.* Rudolph.
" 19. *Fort Franklin.* Hooper.
" 20. *Newfoundland.* Lefroy.
" 20. *Fort Franklin.* Hooper.
" 20. *Christiania.* Hansteen.
" 21. *Christiania.* Hansteen.
" 22. *Fort Franklin.* Hooper.
" 25. *New York.* Hough.
" 27. *Fort Franklin.* Hooper.
" 30. *Fort Franklin.* Hooper.
" 31. *New York.* Hough. *Fort Franklin.* Hooper.

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Jan. 1. *Fort Franklin.* Hooper.
" 3. *Fort Franklin.* Hooper.
" 4. *Fort Franklin.* Hooper.
" 8. *Fort Franklin.* Hooper.
" 9. *Fort Franklin.* Hooper.
" 10. *Fort Franklin.* Hooper.
" 11. *Fort Franklin.* Hooper. *Jakobshavn.* Rudolph.
" 12. *Fort Franklin.* Hooper.
" 12. *Christiania.* Hansteen.
" 13. *Fort Franklin.* Hooper. *Jakobshavn.* Rudolph.
" 14. *Fort Franklin.* Hooper.
" 15. *Fort Franklin.* Hooper.
" 16. *Fort Franklin.* Hooper.
" 16. *Christiania.* Hansteen.
" 17. *Fort Franklin.* Hooper.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 18. *Litchfield.* Hough. *Fort Franklin.* Hooper.
" 18. *Jakobshavn.* Rudolph.
" 19. *Providence.* Caswell. *New York.* Hough.
" 19. *Christiania.* Hansteen.
" 22. *Fort Franklin.* Hooper.
" 25. *Fort Franklin.* Hooper.
" 27. *Fort Franklin.* Hooper.
Jan. 31. *New York.* Hough.
Feb. 1. *Fort Franklin.* Hooper.
" 2. *Fort Franklin.* Hooper.
" 3. *New Haven.* Herrick. Newton and Loomis.
" 3. *New York.* Hough.
" 4. *New York.* Hough.
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *Yakoutsk.* Kupffer.[1]
" 7. *Fort Franklin.* Hooper.
" 10. *Hammerfest, Norway.* Noodt.
" 11. *New Haven?* Herrick. Newton and Loomis.
" 12. *New York.* Hough. *Fort Franklin.* Hooper.
" 13. *New York.* Hough. *Fort Franklin.* Hooper.
" 13. *Christiania.* Hansteen.
" 14. *Fort Franklin.* Hooper.
" 15. *Fort Franklin.* Hooper. *Jakobshavn.* Rudolph.
" 16. *Fort Franklin.* Hooper.
" 17. *New York.* Hough.
" 18. *Aix-la-Chapelle.* Heis.
" 22. *New Haven.* Herrick. Newton and Loomis.
" 22. *New York.* Hough. *Baltischport.* Kupffer.[2]
" 22. *Christiania.* Hansteen.
" 23. *Christiania.* Hansteen.
" 26. *New York.* Hough.
Mar. 1. *Fort Norman.* Hooper.
" 2. *Cambridge.* Bond. Lovering.
" 2. *New York.* Hough.
" 3. *Cambridge.* Bond. Lovering.
" 3. *New Haven?* Bradley. Newton and Loomis.
" 3. *New York.* Hough. *Fort Norman.* Hooper.
" 4. *Cambridge.* Bond. Lovering.
" 4. *New Haven.* Herrick. Newton and Loomis.
" 4. *Providence.* Caswell. *New York.* Hough.
" 4. *Christiania.* Hansteen.
" 5. *Fort Norman.* Hooper.
" 6. *Fort Norman.* Hooper. *Jakobshavn.* Rudolph.
" 7. *Fort Norman.* Hooper.
" 8. *Fort Norman.* Hooper.
" 9. *Sitka.* Kupffer.[3] *Jakobshavn.* Rudolph.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 10. *New York.* Hough. *Fort Norman.* Hooper.
" 10. *Christiania.* Hansteen.
" 11. *Cambridge.* Bond. Lovering.
" 11. *New York.* Hough. *Fort Norman.* Hooper.
" 11. *Christiania.* Hansteen.

[1] Annal. de l'Observ. Phys. Centrale de Russie, 1850, Suppl. p. 27.
[2] Annal. de l'Observ. Phys. Centrale de Russie, 1849, S. p. 109.
[3] Annal de l'Observ. Phys. Centrale de Russie, 1850, p. 375.

Mar. 11. *Baltischport.* Kupffer.
" 12. *Christiania.* Hansteen.
" 13. *Fort Norman.* Hooper.
" 13. *Christiania.* Hansteen. *Jakobshavn.* Rudolph.
" 14. *Fort Norman.* Hooper.
" 15. *Fort Norman.* Hooper.
" 16. *New York.* Hough. *Fort Norman.* Hooper.
" 16. *Christiania.* Hansteen.
" 17. *Fort Norman.* Hooper.
" 18. *New York.* Hough.
" 21. *Fort Norman.* Hooper.
" 22. *New York.* Hough. *Fort Norman.* Hooper.
" 25. *New York.* Hough.
" 26. *New York.* Hough.
" 29. *New York.* Hough.
" 31. *Providence, R. I.* Caswell.
" 31. *New Haven.* Herrick. Newton and Loomis.
" 31. *New York.* Hough. *Litchfield.* Hough.
Apr. 1. *Christiania.* Hansteen.
" 2. *Cambridge.* Bond. Lovering.
" 2. *Fort Norman.* Hooper.
" 3. *Fort Norman.* Hooper.
" 4. *Fort Norman.* Hooper.
" 6. *Cambridge.* Bond. Lovering.
" 6. *Worcester.* Chandler.[1]
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *Providence.* Caswell. *New York.* Hough.
" 6. *Fort Norman.* Hooper. *Sitka.* Kupffer.
" 7. *Cambridge.* Bond. Lovering.
" 7. *Providence, R. I.* Caswell.
" 7. *New Haven.* Herrick. Newton and Loomis.
" 7. *New York.* Hough. *Litchfield.* Hough.
" 8. *New York.* Hough. *Fort Norman.* Hooper.
" 9. *New York.* Hough.
" 14. *New York.* Hough.
" 15. *New York.* Hough.
" 17. *New York.* Hough.
" 19. *New York.* Hough.
" 28. *Fort Norman.* Hooper.
" 30. *Fort Norman.* Hooper.
May 3. *Christiania.* Hansteen.
" 7. *Cambridge.* Bond. Lovering.
" 7. *Worcester.* Chandler.
" 7. *New Haven.* Herrick. Newton and Loomis.
" 7. *Providence.* Caswell. *New York.* Hough.
" 9. *New York.* Hough.
" 10. *New York.* Hough. *Litchfield.* Hough.
" 12. *Worcester.* Chandler. *Providence.* Caswell.

[1] Eighteenth Report of the Lunatic Asylum, p 64.

May 12. *New Haven.* Herrick. Newton and Loomis.
" 12. *New York.* Hough. *Litchfield.* Hough.
" 13. *New York.* Hough.
" 18. *New York.* Hough.
" 22. *New York.* Hough.
June 4. *New York.* Hough. *Litchfield.* Hough.
" 4. *Austria.* Heis. Jahn.
" 7. *New York.* Hough.
" 10. *New York.* Hough.
" 13. *Bonn.* Schmidt.
" 16. *New York.* Hough.
" 22. *New York.* Hough.
" 23. *New York.* Hough.
" 29. *New York.* Hough.
July 1. *New York.* Hough.
" 2. *New York.* Hough.
" 6. *New Haven?* Bradley. Newton and Loomis.
" 7. *New York.* Hough.
" 9. *Litchfield, Conn.* Hough.
" 10. *New York.* Hough.
" 11. *Cambridge.* Bond. Lovering.
" 11. *Worcester.* Chandler. *Providence.* Caswell.
" 11. *New Haven.* Herrick. Newton and Loomis.
" 11. *Litchfield.* Hough. *New York.* Hough.
" 12. *Cambridge.* Bond. Lovering.
" 12. *New Haven.* Herrick. Newton and Loomis.
" 12. *Litchfield.* Hough. *New York.* Hough.
" 15. *New York.* Hough.
" 16. *New York.* Hough.
" 19. *New York.* Hough.
Aug. 2. *New York.* Hough.
" 3. *New York.* Hough.
" 4. *New York.* Hough.
" 6. *New York.* Hough.
" 7. *New York.* Hough.
" 9. *New Haven.* Herrick. Newton and Loomis.
" 9. *Litchfield.* Hough. *New York.* Hough.
" 9. *Sitka.* Kupffer.
" 10. *Cambridge.* Bond. Lovering.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 10. *New York.* Hough.
" 12. *New York.* Hough.
" 15. *New York.* Hough.
" 16. *New York.* Hough. *Litchfield.* Hough.
" 17. *New York.* Hough. *Litchfield.* Hough.
" 18. *New York.* Hough. *Litchfield.* Hough.
" 23. *New York.* Hough.
" 29. *Cambridge.* Bond. Lovering.
" 29. *New York.* Hough.
" 30. *Cambridge.* Bond. Lovering.

Sept. 3. *New Haven.* Herrick. Newton and Loomis.
" 3. *Litchfield.* Hough. *New York.* Hough.
" 3. *Providence.* Caswell. *Christiania.* Hansteen.
" 4. *New Haven.* Herrick. Newton and Loomis.
" 4. *New York.* Hough. *Christiania.* Hansteen.
" 5. *New York.* Hough.
" 6. *New York.* Hough.
" 7. *New York.* Hough. *Sitka.* Kupffer.
" 8. *New Haven.* Bradley. Newton and Loomis.
" 8. *New York.* Hough.
" 9. *Sitka.* Kupffer.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 10. *Litchfield.* Hough. *Providence.* Caswell.
" 10. *Christiania.* Hansteen.
" 11. *Litchfield.* Hough.
" 12. *New York.* Hough.
" 12. *Barrow Strait.* Kane. *Christiania.* Hansteen.
" 13. *New York.* Hough.
" 13. *Hamburg.* Schmidt. *Christiania.* Hansteen.
" 14. *New York.* Hough. *Christiania.* Hansteen.
" 15. *Newport.* Herrick. Newton and Loomis.
" 15. *New York.* Hough. *Barrow Strait.* Kane.
" 18. *Jakobshavn.* Rudolph.
" 28. *New York.* Hough.
" 29. *New York.* Hough. *Litchfield.* Hough.
" 29. *Jakobshavn.* Rudolph.
" 30. *New Haven?* Herrick. Newton and Loomis.
" 30. *New York.* Hough.
Oct. 1. *Worcester.* Chandler. *Providence.* Caswell.
" 1. *New Haven.* Herrick. Newton and Loomis.
" 1. *Litchfield.* Hough. *New York.* Hough.
" 1. *Hamburg.* Schmidt. *Christiania.* Hansteen.
" 1. *Sitka.* Kupffer. *St. Ives, Hunts.* Watts.[1]
" 1. *Jakobshavn.* Rudolph.
" 2. *New Haven.* Herrick. Newton and Loomis.
" 2. *Litchfield.* Hough. *Providence.* Caswell.
" 2. *Hamburg.* Schmidt. *Bonn.* Jahn.
" 2. *Aix-la-Chapelle.* Heis.
" 3. *New York.* Hough. *Litchfield.* Hough.
" 3. *Hamburg.* Schmidt.
" 5. *Christiania.* Hansteen.
" 6. *Litchfield.* Hough. *New York.* Hough.
" 7. *Worcester.* Chandler. *New York.* Hough.
" 8. *New York.* Hough.
" 9. *New York.* Hough.
" 12. *Jakobshavn.* Rudolph.
" 14. *Yakoutsk.* Kupffer. *Jakobshavn.* Rudolph.
" 15. *Christiania.* Hansteen.

[1] Proc. Brit. Assoc. XX. 41.

Oct. 17. *Wellington Channel.* Kane.
" 21. *Wellington Channel.* Kane.
" 22. *Wellington Channel.* Kane.
" 26. *Wellington Channel.* Kane.
" 27. *New Haven.* Herrick. Newton and Loomis.
" 27. *Litchfield.* Hough. *New York.* Hough.
" 27. *Wellington Channel.* Kane.
" 27. *Christiania.* Hansteen.
" 28. *Litchfield.* Hough. *Christiania.* Hansteen.
" 29. *New Haven.* Herrick. Newton and Loomis.
" 29. *Litchfield.* Hough. *New York.* Hough.
" 29. *Wellington Channel.* Kane.
" 31. *Wellington Channel.* Kane.
Nov. 7. *New York.* Hough. *Jakobshavn.* Rudolph.
" 8. *New York.* Hough.
" 8. *Lat.* 74° *N. Long.* 92° *W.* Kane.
" 10. *New Haven.* Bradley. Newton and Loomis.
" 10. *Litchfield.* Hough. *New York.* Hough.
" 10. *Jakobshavn.* Rudolph.
" 11. *New York.* Hough.
" 25. *Jakobshavn.* Rudolph.
" 30. *Jakobshavn.* Rudolph.
Dec. 1. *New Haven?* Bradley. Newton and Loomis.
" 1. *Lat.* 74° *N. Long.* 94° *W.* Austin.[1]
" 1. *Lancaster Sound.* Kane.
" 1. *Griffith's Island.* Markham.[2]
" 3. *Lancaster Sound.* Kane.
" 4. *New York.* Hough.
" 5. *New York.* Hough.
" 5. *Lancaster Sound.* Kane.
" 5. *Griffith's Island.* Markham.
" 6. *New York.* Hough. *Lancaster Sound.* Kane.
" 7. *Jakobshavn.* Rudolph.
" 8. *Lancaster Sound.* Kane.
" 10. *Jakobshavn.* Rudolph.
" 11. *New York.* Hough. *Lancaster Sound.* Kane.
" 15. *Sitka.* Kupffer. *Jakobshavn.* Rudolph.
" 17. *Sitka.* Kupffer.
" 20. *New York.* Hough.
" 23. *Jakobshavn.* Rudolph.
" 26. *New Haven.* Bradley. Newton and Loomis.
" 26. *Lancaster Sound.* Kane.[3]
" 27. *Cambridge.* Bond. Lovering.
" 27. *Lancaster Sound.* Kane.
" 27. *Christiania.* Hansteen.
" 28. *New York.* Hough. *Lancaster Sound.* Kane.

[1] Arctic Miscellanies, p. 113.
[2] Franklin's Footsteps, &c. p. 70.
[3] The U. S. Grinnell Expedition, First, p. 523.

Dec. 28. *Christiania.* Hansteen.
" 29. *Lancaster Sound.* Kane.
" 30. *Jakobshavn.* Rudolph.
" 31. *Lancaster Sound.* Kane.

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Jan. 1.[1] *Lancaster S'd.* Kane. *Jakobshavn.* Rudolph.
" 2. *Lancaster S'd.* Kane. *Jakobshavn.* Rudolph.
" 3. *Lancaster Sound.* Kane.
" 4. *Lancaster Sound.* Kane.
" 4. *Hammerfest.* Noodt.
" 8. *Newberry.* Johnson.
" 15. *Lancaster S'd.* Kane. *Jakobshavn.* Rudolph.
" 19. *Litchfield, Conn.* Hendrick.[2]
" 20. *Catharinebourg and Tobolsk.* Kupffer.[3]
" 20. *Zlatoouste.* Kupffer.[3]
" 21. *Newberry.* Johnson.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *Litchfield.* Hendrick.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *Christiania.* Hansteen. *Lancaster S'd.* Kane.
" 25. *Jakobshavn.* Rudolph.
" 26. *Baffin's Bay.* Kane.
" 27. *Baffin's Bay.* Kane. *Hammerfest.* Noodt.
" 28. *Baffin's Bay.* Kane.
" 29. *Baffin's Bay.* Kane.
Feb. 2. *Baffin's Bay.* Kane. *Bonn.* Schmidt.
" 5. *Cambridge.* Bond. Lovering.
" 5. *Newberry.* Johnson. *Baffin's Bay.* Kane.
" 6. *New York.* Hough.[4] *Baffin's Bay.* Kane.
" 7. *Baffin's Bay.* Kane.
" 9. *Jakobshavn.* Rudolph.
" 12. *Providence, R. I.* Caswell.
" 13. *Baffin's Bay.* Kane.
" 18. *Cambridge.* Bond. Lovering.
" 18. *New York.* Hough. *Providence.* Caswell.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 18. *Newberry.* Johnson. *Litchfield.* Hendrick.
" 19. *New York.* Hough. *Christiania.* Hansteen.
" 19. *Newberry.* Johnson. *Litchfield.* Hendrick.
" 19. *Baffin's Bay.* Kane. *Jakobshavn.* Rudolph.
Feb. 20.[1] *Lat.* 74° *N. Long.* 94° *W.* Austin.
" 20. *Christiania.* Hansteen.
" 21. *Baffin's Bay.* Kane.
" 23. *Litchfield.* Hendrick. *Christiania.* Hansteen.
" 24. *Baffin's Bay.* Kane.
" 25. *Baffin's Bay.* Kane. *Christiania.* Hansteen.
" 26. *Baffin's Bay.* Kane. *Barnaoul.* Kupffer.
" 27. *Baffin's Bay.* Kane. *Hammerfest.* Noodt.
" 28. *Newberry.* Johnson.
Mar. 1. *New York.* Hough.
" 22. *New York.* Hough. *Newberry.* Johnson.
" 22. *New Haven?* Herrick. Newton and Loomis.
" 22. *Litchfield.* Hendrick. *Christiania.* Hansteen.
" 25. *Lat.* 74° *N.* 94° *W.* Austin.[2]
" 26. *Baffin's Bay.* Kane.
" 26. *St. Ives, Hunts.* Watts.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *Worcester.* Chandler.[3] *New York.* Hough.
" 28. *Baffin's Bay.* Kane.
" 29. *Cambridge.* Bond. Lovering.
" 29. *New York.* Hough. *Newberry.* Johnson.
" 29. *New Haven.* Herrick. Newton and Loomis.
" 29. *Litchfield.* Hendrick. *Jakobshavn.* Rudolph.
" 31. *New York.* Hough.
Apr. 1. *New York.* Hough.
" 3. *New York.* Hough.
" 5. *New York.* Hough.
" 6. *Baffin's Bay.* Kane.
" 17. *New York.* Hough.
" 19. *New York.* Hough.
" 22. *New York.* Hough.
" 30. *New York.* Hough.
May 1. *Providence.* Caswell. *New York.* Hough.
" 1. *New Haven.* Herrick. Newton and Loomis.
" 1. *Worcester.* Chandler. *Litchfield.* Hendrick.
" 2. *New York.* Hough.
" 4. *New York.* Hough.
" 12. *New York.* Hough.
" 16. *Litchfield.* Hendrick.
" 20. *New York.* Hough.
" 24. *Cambridge.* Bond. Lovering.
" 26. *Litchfield.* Hendrick.
" 30. *New York.* Hough.
June 5. *Cambridge.* Bond. Lovering.

[1] The aurora was seen *eleven* times in January; *twelve* times in February; and *four* times in March, 1851, by Capt Austin, in Lat. 74° N. and Long. 94° W. Arctic Miscellanies, p. 197, &c.

[2] Regents' Reports of the Univ. New York, 1851, p. 524.

[3] Annal. de l'Observ. Phys. Centrale de Russie, 1851, p. 127 and p. 549.

[4] Regents' Reports of the Univ. New York, 1851.

[1] In regard to the winter of 1850–1, in Lat. 74° N. and Long. 95° W., Osborne says: "With one portion of the phenomena of the North Sea we were particularly disappointed; and this was the aurora." Stray Leaves from an Arctic Journal.

[2] Arctic Miscellanies, p. 291.

[3] Nineteenth Report of the Lunatic Asylum, p. 65.

June 5. *Providence.* Caswell. *New York.* Hough.
" 5. *New Haven.* Herrick. Newton and Loomis.
" 5. *Litchfield.* Hendrick.
" 11. *Litchfield.* Hendrick.
" 27. *Cambridge.* Bond. Lovering.
" 27. *New Haven.* Bradley. Newton and Loomis.
" 27. *Litchfield.* Hendrick.
" 27. *Providence.* Caswell. *New York.* Hough.
July 2. *New York.* Hough.
" 7. *Litchfield.* Hendrick.
" 13. *New York.* Hough.
" 16. *New York.* Hough.
" 17. *Cambridge.* Bond. Lovering.
" 17. *New Haven.* Bradley. Newton and Loomis.
" 17. *Litchfield.* Hendrick. *New York.* Hough.
" 26. *Cambridge.* Bond. Lovering.
" 26. *New Haven.* Bradley. Newton and Loomis.
" 26. *New York.* Hough.
" 29. *New York.* Hough.
Aug. 8. *New York.* Hough.
" 24. *Litchfield.* Hendrick.
" 24. *Leipsic.* Keller. Jahn.
" 25. *Lat.* 61° *N. Long.* 54° *W.* Sutherland.
" 26. *Davis's Strait.* Sutherland.[1]
" 29. *Cambridge.* Bond. Lovering.
" 29. *Litchfield.* Hendrick. *New York.* Hough.
" 30. *Litchfield.* Hendrick.
" 31. *New York.* Hough.
Sept. 1. *Newberry.* Johnson.
" 3. *New Haven.* Olmsted.[2] *New York.* Hough.
" 4. *Cambridge.* Bond. Lovering.
" 4. *New Haven.* Bradley. Newton and Loomis.
" 4. *Worcester.* Chandler. *Rochester.* Dewey?
" 4. *Christiania.* Hansteen. *Yakoutsk.* Kupffer.
" 6. *Cambridge.* Bond. Lovering.
" 6. *New Haven.* Olmsted and Bradley.
" 6. *Litchfield.* Hendrick. *New York.* Hough.
" 7. *Cambridge.* Bond. Lovering.
" 7. *Worcester.* Chandler. *New York.* Hough.
" 7. *New Haven.* Bradley. Newton and Loomis.
" 7. *Litchfield.* Hendrick.
" 7. *Yakoutsk and Barnaoul.* Kupffer.[3]
" 7. *Christiania.* Hansteen.
" 10. *New Haven.* Bradley. Newton and Loomis.
" 13. *New York.* Hough.
Sept. 14. *New York.* Hough.
" 15. *New York.* Hough.
" 16. *Newberry* Johnson. *Litchfield.* Hendrick.
" 16. *New York.* Hough.
" 24. *New York.* Hough.
" 26. *Aix-la-Chapelle.* Heis. Jahn.
" 27. *Hammerfest.* Noodt.
" 28. *New York.* Hough.
" 29. *New Haven.* Olmsted. *Providence.* Caswell.
" 29. *Worcester.* Chandler. *South Carolina.* Gibbes.
" 29. *St. Petersburg.* Kupffer.[1] *Rochester.* Dewey.
" 29. *Newberry.* Johnson. *Georgia.* LeConte.[2]
" 29. *Christiania.* Hansteen.
" 30. *St. Petersburg.* Kupffer.
" 30. *Kamens.* Vogel. Jahn. *Prague.*[3]
" 30. *Neunkirchen. Lichtenberger.* Jahn.
Oct. 1. *New Haven.* Bradley. Newton and Loomis.
" 1. *New York.* Hough.
" 2. *Cambridge.* Bond. Lovering.
" 2. *New Haven.* Herrick. Newton and Loomis.
" 2. *New York.* Hough. *Providence.* Caswell.
" 2. *Brussels.* Quetelet. *Yakoutsk.* Kupffer.
" 3. *Bonn.* Schmidt. *Dresden.* Jahn.
" 3. ——— Heis. Jahn.
" 4. *Hammerfest.* Noodt.
" 18. *Newberry.* Johnson. *New York.* Hough.
" 18. *Bonn.* Schmidt.
" 19. *New York.* Hough. *Christiania.* Hansteen.
" 20. *Cambridge.* Bond. Lovering.
" 20. *Worcester.* Chandler. *Providence.* Caswell.
" 20. *New Haven.* Herrick. Newton and Loomis.
" 20. *Litchfield.* Hendrick. *Newberry.* Johnson.
" 21. *Worcester.* Chandler.
" 21. *New York.* Hough. *Christiania.* Hansteen.
" 22. *New York.* Hough.
" 23. *Cambridge.* Bond. Lovering.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *Litchfield.* Hendrick. *Providence.* Caswell.
" 24. *Hammerfest.* Noodt.
" 26. *New York.* Hough.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 29. *Batty Bay.* Kennedy.[4]
Nov. 11. *New York.* Hough.
" 15. *Cambridge.* Bond. Lovering.
" 17. ——— Jahn.

[1] Journal of a Voyage, &c. II. 346.
[2] Amer. Journ. Sci. Second Series, XII. 442.
[3] Annal. de l'Observ. Phys. Centrale de Russie, 1851, p. 213 and p. 575.

[1] Annal. de l'Observ. Phys. Centrale de Russie, 1851, p. 57.
[2] Amer. Journ. Sci. Second Series, XIII. 128.
[3] Kreil's Jahrbuch fur Prag. III. 126–7.
[4] Procedings of Mr. W. Kennedy, &c. p. 86.

Nov. 20. *Hammerfest.* Noodt.
" 21. *Hammerfest.* Noodt.
" 22. *Christiania.* Hansteen.
" 30. ——— Jahn.
Dec. 5. *New York.* Hough.
" 6. *Christiania.* Hansteen.
" 18. ——— Jahn.
" 21. *Hammerfest.* Noodt. Jahn.
" 23. *New York.* Hough.
" 23. *Christiania.* Hansteen. *Hammerfest.* Noodt.
" 25. *New York.* Hough.
" 25. *Christiania.* Hansteen.
" 26. *New York.* Hough.
" 26. *Hannover.* Pape. Jahn.
" 27. *New York.* Hough.
" 28. *Batty Bay.* Bellot.[1]
" 28. *Christiania.* Hansteen. *Yakoutsk.* Kupffer.
" 28. *Belgium.* Montigny.[2]
" 29. *Cambridge.* Bond. Lovering.
" 29. *Litchfield.* Hendrick.
" 30. *Cambridge.* Bond. Lovering.
" 31. *Osnabrück.* Jahn.

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Jan. 3. ——— Jahn.
" 10. *Christiania.* Hansteen.
" 17. *Hammerfest.* Noodt.
" 19. *Cambridge.* Bond. Lovering.
" 19. *Litchfield.* Hendrick. *Providence.* Caswell.
" 19. *Burlington.* Thompson.[3] *Sonora.* Goddard.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *San Francisco.* Gibbon. *Tennessee.* Morris.[4]
" 19. *Hammerfest.* Noodt. *Sitka.* Kupffer.
" 20. *Worcester.* Chandler.
" 20. *Bonn.* Schmidt. Jahn. *Yakoutsk.* Kupffer.
" 20. *Elberfeld.* Jahn. *Aix-la-Chapelle.* Heis.
" 21. *Burlington.* Thompson.
" 22. *Yakoutsk.* Kupffer.
" 23. *Burlington.* Thompson.
" 25. *Worcester.* Chandler. *Litchfield.* Hendrick.
" 25. *Burlington.* Thompson. *Providence.* Caswell.
" 25. *Aix-la-Chapelle.* Heis. Jahn.
" 25. *Hammerfest.* Noodt. Jahn.
" 26. *Burlington.* Thompson.
Feb. 1. *Christiania.* Hansteen.

[1] Memoirs of J. R. Bellot, &c. II. 73.
[2] Amer. Journ. Sci. Second Series, XIV. 289.
[3] Amer. Journ. Sci. Second Series, XV. 459.
[4] Amer. Journ. Sci. Second Series, XVII. 140. and XXIX. 260.

Feb. 15. *New Haven.* Olmsted. *Litchfield.* Hendrick.[1]
" 15. *Christiania.* Hansteen. *Yakoutsk.* Kupffer.
" 16. *New Haven.* Herrick and Olmsted.
" 16. *Litchfield.* Hendrick. *Burlington.* Thompson.
" 16. *Christiania.* Hansteen. *Hammerfest.* Noodt.
" 17. *New Haven.* Herrick. Newton and Loomis.
" 17. *Providence.* Caswell. *Christiania.* Hansteen.
" 18. *Cambridge.* Bond. Lovering.
" 18. *New Haven.* Herrick and Olmsted.
" 18. *Burlington.* Thompson. *Newberry.* Johnson.
" 18. *Catharinebourg and Sitka.* Kupffer.
" 18. *Yakoutsk and Ichim.* Kupffer.[2]
" 18. *Christiania.* Hansteen. *Kertchinsk.* Kupffer.
" 19. *Cambridge.* Bond. Lovering.
" 19. *New Haven.* Herrick and Olmsted.
" 19. *Burlington.* Thompson. *Newberry.* Johnson.
" 19. *Litchfield.* Hendrick. *Rochester.* Dewey.
" 19. *Tennessee.* Morris. *San Francisco.*[3] Gibbon.
" 19. *Dunse.* Stevenson. *St. Ives, Hunts.* Watts.[4]
" 19. *Bonn.* Schmidt. Jahn.
" 19. *Barnaoul and Kertchinsk.* Kupffer.[5]
" 19. *Christiania.* Hansteen. *Ichim.* Kupffer.
" 20. *Cambridge.* Bond. Lovering.
" 20. *New Haven.* Herrick. Newton and Loomis.
" 20. *Litchfield.* Hendrick. *Newberry.* Johnson.
" 20. *Yakoutsk and Tobolsk.* Kupffer.
" 20. *Christiania.* Hansteen.
" 20. *Verden.* Pape. *Leipsic, &c.* Jahn.
" 21. *Christiania.* Hansteen. *Tobolsk.* Kupffer.
" 21. *Hammerfest.* Noodt.
" 21. *Dunse.* Stevenson. *St. Ives, Hunts.* Watts.
" 26. *Cambridge.* Bond. Lovering.
" 27. *Burlington.* Thompson.
" 27. *Sitka.* Kupffer.
Mar. 4. *Cambridge.* Bond. Lovering.
" 6. *Christiania.* Hansteen.
" 7. *New Haven.* Herrick. Newton and Loomis.
" 7. *Litchfield.* Hendrick. *Burlington.* Thompson.
" 7. *Christiania.* Hansteen. *Sitka.* Kupffer.
" 9. *New Haven.* Herrick. Newton and Loomis.
" 9. *Christiania.* Hansteen.
" 10. *Burlington.* Thompson. ——— Jahn.

[1] Amer. Journ. Sci. Second Series, XIII. 426.
[2] Annal. de l'Observ. Phys. Centrale de Russie, 1859, Suppl. p. 95.
[3] Dr. Gibbon says, that he saw the aurora at San Francisco, once in January, and once in February, 1852. Smithsonian Reports, 1854, p. 258. Amer. Jour. Sci. Second Series, XXVII. 260.
[4] Proc. Brit. Assoc. XXI. 32.
[5] Annal. de l'Observ. Phys. Centrale de Russie, 1852, pp. 127, 213, 311, et 561.

Mar. 12. *Yakoutsk.* Kupffer.
" 15. *Christiania.* Hansteen. *Verden.* Jahn.
" 16. *Burlington.* Thompson.
" 19. *Burlington.* Thompson.
" 20. *Burlington.* Thompson.
" 21. *St. Ives, Hunts.* Watts.
" 21. *Christiania.* Hansteen.
" 25. *Warsaw.* Jahn.
" 26. *Bonn.* Schmidt. *Leipsic.* Jahn.
" 26. *Christiania.* Hansteen.
" 29. *Sitka.* Kupffer.
" 31. *Christiania.* Hansteen.
Apr. 8. *Burlington.* Thompson.
" 8. *Christiania.* Hansteen.
" 9. *Christiania.* Hansteen.
" 10. *Cambridge.* Bond. Lovering.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 10. *Litchfield.* Hendrick. *Christiania.* Hansteen.
" 12. *Verden.* Spengler. Jahn.
" 13. *Burlington.* Thompson.
" 14. *Burlington.* Thompson.
" 15. *New Haven.* Bradley. Newton and Loomis.
" 15. *Christiania.* Hansteen.
" 16. *Litchfield.* Hendrick.
" 17. *Burlington.* Thompson.
" 17. *Christiania.* Hansteen.
" 18. *Christiania.* Hansteen.
" 19. *Newberry.* Johnson.
" 20. *Burlington.* Thompson. *Bogoslowski.* Kupffer.[1]
" 22. *New Haven.* Herrick. Newton and Loomis.[2]
" 22. *Providence.* Caswell. *Tennessee.* Morris.
May 3. *Burlington.* Thompson.
" 5. *Burlington.* Thompson.
" 8. *Burlington.* Thompson.
" 9. *Burlington.* Thompson. *Tennessee.* Morris.
" 10. *Providence, R. I.* Caswell.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 14. *Burlington.* Thompson.
" 17. *New Haven.* Herrick. Newton and Loomis.
" 18. *Cambridge.* Bond. Lovering.
" 18. *Burlington.* Thompson. *Providence.* Caswell.
" 18. *New Haven.* Herrick. Newton and Loomis.
" 19. *Cambridge.* Bond. Lovering.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *Providence, R. I.* Caswell.
" 20. *Cambridge.* Bond. Lovering.
" 20. *New Haven.* Herrick. Newton and Loomis.

[1] Annal. de l'Observ. Phys. Centrale de Russie, 1852, p. 629.
[2] Amer. Journ. Sci. Second Series, XIV. 130–1.

May 20. *Providence, R. I.* Caswell.
" 21. *Cambridge.* Bond. Lovering.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 25. *Litchfield.* Hendrick.
June 5. *New Haven.* Herrick. Newton and Loomis.
" 9. *Newberry.* Johnson.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 10. *Litchfield.* Hendrick.
" 11. *New Haven.* Herrick. Newton and Loomis.
" 11. *Burlington.* Thompson. *Providence.* Caswell.
" 11. *Litchfield.* Hendrick.[1]
" 15. *New Haven.* Herrick. Newton and Loomis.
" 16. *Cambridge.* Bond. Lovering.
" 16. *New Haven.* Herrick. Newton and Loomis.
" 16. *Burlington.* Thompson.
July 3. *Providence, R. I.* Caswell.
" 5. *Cambridge.* Bond. Lovering.
" 5. *Burlington.* Thompson.
" 6. *Cambridge.* Bond. Lovering.
" 6. *New Haven.* Herrick. Newton and Loomis.
" 7. *Cambridge.* Bond. Lovering.
" 8. *Cambridge.* Bond. Lovering.
" 9. *Cambridge.* Bond. Lovering.
" 9. *New Haven.* Herrick. Newton and Loomis.
" 9. *Litchfield.* Hendrick. *Providence.* Caswell.
" 10. *Cambridge.* Bond. Lovering.
" 10. *New Haven.* Bradley. Newton and Loomis.
" 10. *Litchfield.* Hendrick.
" 11. *Cambridge.* Bond. Lovering.
" 11. *Munster.* Heis. Jahn.
" 12. *Cambridge.* Bond. Lovering.
" 12. *Burlington.* Thompson.
" 13. *Cambridge.* Bond. Lovering.
Aug. 2. *Davis's Strait. L.*60° *N. L'g.*49° *W.* Inglefield.
" 4. *At Sea. Lat.* 61° *N. Long.* 49° *W.* Inglefield.
" 10. *Burlington.* Thompson. ——— Jahn.
" 11. *New Haven?* Herrick. Newton and Loomis.
" 11. *Burlington.* Thompson. ——— Jahn.
" 14. *Cambridge.* Bond. Lovering.
Sept. 2. *Cambridge.* Bond. Lovering.
" 4. *Cambridge.* Bond. Lovering.
" 4. *Christiania.* Hansteen.
" 5. *Cambridge.* Bond. Lovering.
" 6. *Cambridge.* Bond. Lovering.
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *Burlington.* Thompson.
" 6. *Christiania.* Hansteen.
" 9. *Christiania.* Hansteen.

[1] Regents' Reports of the Univ. New York, 1853, p. 244.

Sept. 10. *Christiania.* Hansteen.
" 11. *Christiania.* Hansteen.
" 12. *Cambridge.* Bond. Lovering.
" 12. *Christiania.* Hansteen. Jahn.
" 13. ——— Jahn.
" 16. *Cambridge.* Bond. Lovering.
" 16. *New Haven.* Herrick. Newton and Loomis.
" 16. *Newberry.* Johnson. *Providence.* Caswell.
" 16. *Christiania.* Hansteen.
" 17. *Cambridge.* Bond. Lovering.
" 17. *New Haven.* Herrick. Newton and Loomis.
" 17. *Burlington.* Thompson. *Newberry.* Johnson.
" 17. *Christiania.* Hansteen. ——— Jahn.
" 18. *Cambridge.* Bond. Lovering.
" 18. *Burlington.* Thompson. *Newberry.* Johnson.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *Christiania.* Hansteen.
" 20. *Christiania.* Hansteen.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *Baffin's Bay.* Inglefield. ——— Jahn.
" 22. *Lake Superior.* Wagner. Boué.
" 23. *Christiania.* Hansteen.
" 29. *Cambridge.* Bond. Lovering.
" 29. *New Haven.* Herrick. Newton and Loomis.
Oct. 5. *Cambridge.* Bond. Lovering.
" 5. *New Haven.* Herrick. Newton and Loomis.
" 5. *Burlington.* Thompson.
" 6. *Burlington.* Thompson.
" 7. *Christiania.* Hansteen.
" 7. *Catharinebourg.* Kupffer.
" 9. *Cambridge.* Bond. Lovering.
" 10. *Verden.* Jahn.
" 13. *Cambridge.* Bond. Lovering.
" 13. *Verden.* Jahn.
" 18. *Christiania.* Hansteen. *Verden.* Jahn.
" 18. *Wurtemberg.* Jahn. *Barnaoul.* Kupffer.
" 19. *New Haven.* Herrick. Newton and Loomis.
" 19. *Newberry.* Johnson. *Providence.* Caswell.
" 20. *New Haven.* Herrick. Newton and Loomis.
" 20. *Newberry.* Johnson.
" 21. *Off Cape Farewell.*[1] Inglefield.[2]
Nov. 10. *Cambridge.* Bond. Lovering.
" 10. *Providence, R. I.* Caswell.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 10. *Verden.* Pape. Jahn.
" 11. *Cambridge.* Bond. Lovering.
" 11. *New Haven.* Herrick. Newton and Loomis.

[1] Proceedings of Capt. E. A. Inglefield, p. 205.
[2] Inglefield adds, that the aurora was frequently very brilliant. Force's Record of Auroral Phenomena, p. 7.

Nov. 11. *Burlington.* Thompson. *Providence.* Caswell.
" 11. *Newberry.* Johnson.[1]
" 11. *Dunse.* Stevenson. *Christiania.* Hansteen.
" 11. *Wurtemberg and Verden.* Pape. Jahn.
" 12. *New Haven.* Herrick. Newton and Loomis.
" 12. *Christiania.* Hansteen.
" 13. *Christiania.* Hansteen.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *Hammerfest.* Noodt.
" 15. *Cambridge.* Bond. Lovering.
" 16. *Cambridge.* Bond. Lovering.
" 16. *Sitka.* Kupffer.
" 17. *Hammerfest.* Noodt.
" 18. *Yakoutsk.* Kupffer.
" 19. *Burlington.* Thompson.
" 25. *Christiania.* Hansteen.
Dec. 2. *Cambridge.* Bond. Lovering.
" 2. *Northumberland Sound.* Belcher.[2]
" 3. *Christiania.* Hansteen.
" 4. *Christiania.* Hansteen.
" 5. *Cambridge.* Bond. Lovering.
" 5. *Worcester.* Chandler.
" 5. *Northumberland Sound.* Belcher.
" 5. *New Haven.* Herrick. Newton and Loomis.
" 6. *Christiania.* Hansteen.
" 6. *Northumberland Sound.* Belcher.
" 7. *Hammerfest.* Noodt.
" 8. *Cambridge.* Bond. Lovering.
" 8. *Burlington.* Thompson. *Hammerfest.* Noodt.
" 9. *Northumberland Sound.* Belcher.
" 9. *Sitka.* Kupffer.
" 10. *Northumberland Sound.* Belcher.
" 11. *Neunkirchen.* Lichtenberger. Jahn.
" 11. *Sitka.* Kupffer.
" 12. *Northumberland Sound.* Belcher.
" 13. *New Haven?* Herrick. Newton and Loomis.
" 13. *Christiania.* Hansteen.
" 14. *Cambridge.* Bond. Lovering.
" 14. *Bogoslowski.* Kupffer.
" 15. *Cambridge.* Bond. Lovering.
" 17. *New Haven.* Herrick. Newton and Loomis.
" 18. *Christiania.* Hansteen. *Sitka.* Kupffer.
" 28. *Sitka.* Kupffer.
" 29. *Cambridge.* Bond. Lovering.
" 29. *Worcester.* Chandler.
" 29. *Christiania.* Hansteen.
" 29. *Near Hartford.* Herrick. Newton and Loomis.

[1] Regents' Reports of the Univ. New York, 1853, p. 249.
[2] The last of the Arctic Voyages, &c. I. 173.

1853.[1]

Jan. 4. *Burlington, Vermont.* Thompson.[2]
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *Burlington.* Thompson.
" 8. *Burlington.* Thompson. *Newberry.* Johnson.
" 9. *Cambridge.* Bond. Lovering.
" 10. *Christiania.* Hansteen.
" 12. *St. Martin, Canada.* Smallwood.[3]
" 13. *St. Martin, Canada.* Smallwood.[4]
" 14. *Christiania.* Hansteen.
" 18. *Hammerfest.* Noodt.
" 27. *Christiania.* Hansteen.
" 28. *Christiania.* Hansteen.
" 29. *Hammerfest.* Noodt.
" 30. *Cambridge.* Bond. Lovering.
" 30. *Worcester.* Chandler.[5]
" 31. *Newberry.* Johnson.
Feb. 1. *Cambridge.* Bond. Lovering.
" 1. *Newberry.* Johnson. *St. Martin.* Smallwood.
" 4. *Tobolsk.* Kupffer.
" 8. *Burlington.* Thompson.
" 8. *St. Martin.* Smallwood.
" 13. *Hammerfest.* Noodt.
" 14. *Cambridge.* Bond. Lovering.
" 14. *New Haven.* Herrick. Newton and Loomis.
" 14. *Burlington.* Thompson.
" 14. *St. Martin.* Smallwood.
" 20. *St. Martin.* Smallwood.
" 21. *Newberry.* Johnson.
" 28. *Hammerfest.* Noodt.
Mar. 1. *Hammerfest.* Noodt.
" 7. *Burlington.* Thompson. *Newberry.* Johnson.
" 8. *Cambridge.* Bond. Lovering.
" 8. *Burlington.* Thompson. *Newberry.* Johnson.
" 8. *St. Martin.* Smallwood.
" 9. *Cambridge.* Bond. Lovering.
" 9. *New Haven.* Bradley. Newton and Loomis.
" 10. *New Haven?* Bradley. Newton and Loomis.
" 10. *Burlington.* Thompson.
" 11. *Yakoutsk.* Kupffer.
Mar. 12. *Dunse.* Stevenson.
" 13. *Cambridge.* Bond. Lovering.
" 13. *New Haven?* Bradley. Newton and Loomis.
" 14. *New Haven.* Bradley. Newton and Loomis.
" 17. *Christiania.* Hansteen.
" 18. *Cambridge.* Bond. Lovering.
" 27. *New Haven.* Herrick. Newton and Loomis.
" 30. *Burlington.* Thompson.
" 30. *Christiania.* Hansteen. *Yakoutsk.* Kupffer.
" 31. *Yakoutsk.* Kupffer.
Apr. 1. *Burlington.* Thompson.
" 1. *St. Martin.* Smallwood.
" 5. *Cambridge.* Bond. Lovering.
" 5. *Worcester.* Chandler.
" 5. *New Haven.* Herrick. Newton and Loomis.
" 5. *St. Martin.* Smallwood.
" 6. *Newberry.* Johnson.
" 6. *New Haven.* Herrick. Newton and Loomis.
" 6. *St. Martin.* Smallwood. *Yakoutsk.* Kupffer.
" 7. *Burlington.* Thompson.
" 8. *Christiania.* Hansteen.
" 9. *Cambridge.* Bond. Lovering.
" 9. *Christiania.* Hansteen.
" 10. *New Haven.* Herrick. Newton and Loomis.
" 10. *Burlington?* Thompson.
" 10. *St. Martin.* Smallwood.
" 11. *Cambridge.* Bond. Lovering.
" 12. *Yakoutsk.* Kupffer.
May 1. *Burlington.* Thompson.
" 1. *St. Martin.* Smallwood.
" 2. *Cambridge.* Bond. Lovering.
" 2. *New Haven.* Herrick. Newton and Loomis.
" 2. *Worcester.* Chandler.
" 2. *Newberry.* Johnson. *Burlington.* Thompson.
" 2. *Providence.* Caswell. *St. Martin.* Smallwood.
" 4. *Cambridge.* Bond. Lovering.
" 4. *Burlington.* Thompson. *Newberry.* Johnson.
" 4. *St. Martin.* Smallwood.
" 5. *Cambridge.* Bond. Lovering.
" 6. *Burlington.* Thompson.
" 7. *Cambridge.* Bond. Lovering.
" 7. *Burlington.* Thompson. *Newberry.* Johnson.
" 10. *Catharinebourg.* Kupffer.[1]
" 13. *New Haven.* Herrick. Newton and Loomis.
" 24. *Providence, R. I.* Caswell.
" 24. *Perryville, Illinois.* Wheeler.[2]
" 30. *St. Martin.* Smallwood.

[1] Maguire refers to a frequent display of the aurora during the winter of 1823–4, at Moore's Harbor, in Lat. 71° N. and Long. 156° W. Proceedings of Capt. Maguire, &c.

[2] Amer. Jour. Sci. Second Series, XVII. 446.

[3] Amer. Journ. Sci. Second Series, XVII. 288.

[4] Smallwood observed traces of the aurora in thirty-nine nights in 1853; in fifty nights in 1854, and in thirty-seven nights in 1855. Amer. Journ. Sci. Second Series, XXI. 288.

[5] Twenty-First Report of the Lunatic Asylum, p. 77.

[1] Annal. de l'Observ. Phys. Centrale de Russie, 1853, p. 136.

[2] Amer. Journ. Sci. Second Series, XVI. 298.

May 31. *New Haven.* Herrick. Newton and Loomis.
" 31. *Burlington.* Thompson.
June 1. *Cambridge.* Bond. Lovering.
" 1. *Providence, R. I.* Caswell.
" 1. *New Haven.* Herrick. Newton and Loomis.
" 2. *Burlington.* Thompson.
" 6. *Cambridge.* Bond. Lovering.
" 8. *Burlington.* Thompson.
" 9. *Cambridge.* Bond. Lovering.
" 9. *New Haven.* Bradley. Newton and Loomis.
" 9. *Burlington.* Thompson.
" 14. *Cambridge.* Bond. Lovering.
" 14. *St. Martin.* Smallwood.
" 30. *St. Martin.* Smallwood.
July 4. *Burlington.* Thompson.
" 10. *Burlington.* Thompson.
" 10. *St. Martin.* Smallwood.
" 11. *St. Martin.* Smallwood.
" 12. *Cambridge.* Bond. Lovering.
" 12. *New Haven.* Herrick. Newton and Loomis.
" 12. *Burlington.* Thompson.
" 12. *St. Martin.* Smallwood.
" 12. *Hawarden.* Jahn.
" 16. *Cambridge.* Bond. Lovering.
" 18. *St. Martin.* Smallwood.
" 23. *Burlington.* Thompson.
" 23. *St. Martin.* Smallwood.
" 26. *St. Martin.* Smallwood.
" 27. *St. Martin.* Smallwood.
Aug. 7. *St. Martin.* Smallwood.
" 11. *New Haven.* Herrick.[1] Newton and Loomis.
" 20. *Hawarden.* Jahn.
" 25. *St. Martin.* Smallwood.
" 26. *Newberry.* Johnson. *Hawarden.* Jahn.
" 30. *Hawarden.* Jahn.
" 31. *Burlington.* Thompson.
" 31. *St. Martin.* Smallwood. *Arbroath.* Jahn.
Sept. 1. *Cambridge.* Bond. Lovering.
" 1. *New Haven.* Herrick. Newton and Loomis.
" 1. *Worcester.* Chandler. *Burlington.* Thomson.
" 1. *St. Martin.* Smallwood. *Greenwich.* Jahn.
" 2. *Cambridge.* Bond. Lovering.
" 2. *Worcester.* Chandler.
" 2. *New Haven.* Herrick. Newton and Loomis.
" 2. *Burlington.* Thomson. *Newberry.* Johnson.
" 2. *St. Martin.* Smallwood.
" 2. *Bermuda.* Herrick. Newton and Loomis.
" 2. *Liverpool, York, &c.* Jahn.

[1] Amer. Journ. Sci. Second Series, XVI. 288.

Sept. 2. *Angeln in Schleswig.* Jahn.
" 2. *Catharinebourg.* Kupffer. *Prague.* Böhm.[1]
" 3. *Cambridge.* Bond. Lovering.
" 3. *Worcester.* Chandler.
" 3. *Burlington.* Thompson. *Newberry.* Johnson.
" 3. *St. Martin.* Smallwood. *Clifton.* Jahn.
" 4. *Cambridge.* Bond. Lovering.
" 6. *Yakoutsk.* Kupffer.
" 8. *Arbroath.* Jahn.
" 10. *Burlington.* Thompson.
" 12. *St. Martin.* Smallwood.
" 18. *St. Martin.* Smallwood.
" 24. *Burlington.* Thompson.
" 24. *St. Martin.* Smallwood.
" 28. *Durham.* Jahn.
Oct. 6. *Cambridge.* Bond. Lovering.
" 23. *St. Martin.* Smallwood.
" 31. *Cambridge.* Bond. Lovering.
" 31. *Burlington.* Thompson. *Newberry.* Johnson.
" 31. *New Haven.* Bradley. Newton and Loomis.
" 31. *Bedfordshire.* Jahn. *Munster.* Heis. Jahn.
Nov. 1. *New Haven.* Herrick. Newton and Loomis.
" 1. *Newberry.* Johnson.[2] *Burlington.* Thompson.
" 1. *Munster.* Heis. Jahn.
" 2. *Cambridge.* Bond. Lovering.
" 6. *Yakoutsk.* Kupffer.
" 9. *St. Martin.* Smallwood.
" 12. *Yakoutsk.* Kupffer.
" 13? *Van Rensselaer Harbor.* Kane.
" 19. *Hammerfest.* Noodt.
" 26. *Van Rensselaer Harbor.* Kane.
" 27. *St. Martin.* Smallwood.
" 28. *Van Rensselaer Harbor.* Kane.
" 30. *Van Rensselaer Harbor.* Kane.
Dec. 1. *Van Rensselaer Harbor.* Kane.
" 4. *Burlington.* Thompson. *Newberry.* Johnson.
" 4. *St. Martin.* Smallwood. *Hammerfest.* Noodt.
" 4. *Van Rensselaer Harbor?* Kane.
" 6. *Yakoutsk.* Kupffer.
" 8. *Burlington.* Thompson.
" 8. *Van Rensselaer Harbor?* Kane.
" 20. *St. Martin.* Smallwood.
" 23. *New Haven.* Bradley. Newton and Loomis.
" 24. *Cambridge.* Bond. Lovering.
" 24. *Van Rensselaer Harbor.* Kane.
" 28. *Cambridge.* Bond. Lovering.
" 28. *St. Martin.* Smallwood.
" 29. *Van Rensselaer Harbor.* Kane.

[1] Magnet. et Meteor. Observ. zu Prag. 1853, p. 107.
[2] Regents' Reports of the Univ. New York, 1854, p. 308.

1854.

Jan. 2. *Cambridge.* Bond. Lovering.
" 2. *Worcester.* Chandler.[1]
" 2. *New Haven.* Herrick. Newton and Loomis.
" 2. *Newberry.* Johnson. *Providence.* Caswell.
" 2. *Catharinebourg.* Kupffer.[2]
" 3. *Zlatoouste.* Kupffer.[2] *Hammerfest.* Noodt.
" 3. *Bogoslowski.* Kupffer.[2]
" 8. *St. Martin.* Smallwood.[3]
" 17. *Hammerfest.* Noodt.
" 23. *Cambridge.* Bond. Lovering.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *Worcester.* Chandler.
" 23. *St. Martin.* Smallwood.
" 27. *Van Rensselaer Harbor.* Kane.
" 28. *Cambridge.* Bond. Lovering.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *Newberry.* Johnson.
" 28. *St. Martin.* Smallwood.
" 28. *Van Rensselaer Harbor.* Kane.
" 29. *Newberry.* Johnson.
" 29. *St. Martin.* Smallwood.
" 30. *Newberry.* Johnson.
Feb. 2. *Cambridge.* Bond. Lovering.
" 4. *Van Rensselaer Harbor.* Kane.
" 4. *Hammerfest.* Noodt.
" 5. *Van Rensselaer Harbor.* Kane.
" 10. *St. Martin.* Smallwood.
" 11. *St. Martin.* Smallwood.
" 16. *Cambridge.* Bond. Lovering.
" 16. *Worcester.* Chandler.
" 16. *St. Martin.* Smallwood.
" 17. *Cambridge.* Bond. Lovering.
" 17. *Worcester.* Chandler. *Newberry.* Johnson.
" 24. *Newberry.* Johnson.
" 24. *St. Martin.* Smallwood.
" 24. *Catharinebourg.* Kupffer. *Hammerfest.* Noodt.
" 25. *Catharinebourg.* Kupffer.
" 26. *Bogoslowski.* Kupffer.
" 27. *Cambridge.* Bond. Lovering.
" 27. *Newberry.*[4] Johnson. *St. Martin.* Smallwood.
Mar. 3. *Millford, Illinois.* Hendrick.[4]
" 6. *St. Martin.* Smallwood.
Mar. 15. *New Haven.* Bradley. Newton and Loomis.
" 16. *Cambridge.* Bond. Lovering.
" 16. *St. Martin.* Smallwood.
" 20. *St. Martin.* Smallwood.
" 21. *Cambridge.* Bond. Lovering.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *Newberry.* Johnson. *St. Martin.* Smallwood.
" 27. *Worcester.* Chandler.
" 27. *New Haven.* Herrick. Newton and Loomis.
" 27. *Providence.* Caswell. *Rochester.* Dewey.
" 28. *Cambridge.* Bond. Lovering.
" 28. *Worcester.* Chandler.
" 28. *New Haven.* Herrick. Newton and Loomis.
" 28. *Providence, R. I.* Caswell.
" 28. *Catharinebourg.* Kupffer.
" 29. *Cambridge.* Bond. Lovering.
" 29. *Worcester.* Chandler.
" 29. *New Haven.* Herrick. Newton and Loomis.
" 29. *Newberry.* Johnson. *St. Martin.* Smallwood.
" 30. *Providence, R. I.* Caswell.
" 30. *St. Martin.* Smallwood.
Apr. 10. *Illinois.* Hendrick. *Rochester.* Dewey.
" 14. *St. Martin.* Smallwood.
" 15. *St. Martin.* Smallwood.
" 20. *Cambridge.* Bond. Lovering.
" 20. *Newberry.* Johnson.
" 21. *Cambridge.* Bond. Lovering.
" 21. *New Haven.* Herrick. Newton and Loomis.
" 21. *St. Martin.* Smallwood.
" 23. *Cambridge.* Bond. Lovering.
" 23. *Worcester.* Chandler.
" 23. *New Haven.* Herrick. Newton and Loomis.
" 23. *Newberry.* Johnson. *St. Martin.* Smallwood.
" 24. *Newberry.* Johnson. *St. Martin.* Smallwood.
May 1. *Cambridge.* Bond. Lovering.
" 4. *St. Martin.* Smallwood.
" 15. *Cambridge.* Bond. Lovering.
" 15. *New Haven.* Herrick. Newton and Loomis.
" 16. *Cambridge.* Bond. Lovering.
" 16. *New Haven?* Herrick. Newton and Loomis.
" 16. *St. Martin.* Smallwood.
" 19. *Cambridge.* Bond. Lovering.
" 21. *Providence, R. I.* Caswell.
" 23. *St. Martin.* Smallwood.
" 26. *St. Martin.* Smallwood.
" 28. *St. Martin.* Smallwood.
June 12. *Cambridge.* Bond. Lovering.
" *x.* *St. Martin.* Smallwood.
" *x.* *St. Martin.* Smallwood.
July 3. *St. Martin.* Smallwood.

[1] Twenty-Second Report of the Lunatic Asylum, p. 88.
[2] Annal. de l'Observ. Phys. Centrale de Russie, 1854, pp. 127 et 525.
[3] Amer. Journ. Sci. Second Series, XX. 141.
[4] Regents' Reports of the Univ. New York, 1855, pp. 328 and 330.

July 5. *St. Martin.* Smallwood.
" 10. *Cambridge.* Bond. Lovering.
" 10. *Rochester, N. Y.* Dewey.
" 12. *St. Martin.* Smallwood.
" 14. *St. Martin.* Smallwood.
" 27. *Cambridge.* Bond. Lovering.
" 27. *St. Martin.* Smallwood.
" 29. *St. Martin.* Smallwood.
" 30. *St. Martin.* Smallwood.
Aug. 17. *St. Martin.* Smallwood.
" 20. *St. Martin.* Smallwood.
" 25. *St. Martin.* Smallwood.
Sept. 10. *St. Martin.* Smallwood.
" 12. *St. Martin.* Smallwood.
" 13. *Cambridge.* Bond. Lovering.
" 13. *St. Martin.* Smallwood.
" 14. *Clays, near Amiens.* Quetelet.[1]
" 15. *St. Martin.* Smallwood.
" 17. *St. Martin.* Smallwood.
" 20. *St. Martin.* Smallwood.
" 21. *Cambridge.* Bond. Lovering.
" 21. *Worcester.* Chandler.
" 21. *New Haven.* Bradley. Newton and Loomis.
" 21. *Newberry.* Johnson. *St. Martin.* Smallwood.
" 22. *Worcester.* Chandler.
" 23. *Worcester.* Chandler.
" 25. *Hammerfest.* Noodt.
" 26. *Cambridge.* Bond. Lovering.
" 26. *Worcester.* Chandler.
" 26. *Providence.* Caswell. *Newberry.* Johnson.
" 26. *New Haven.* Bradley. Newton and Loomis.
" 26. *Illinois.* Hendrick. *Rochester.* Dewey.
" 26. *St. Martin.* Smallwood.
Oct. 8. *Millford, Illinois.* Hendrick.
" 18. *Cambridge.* Bond. Lovering.
" 18. *Providence.* Caswell. *Illinois.* Hendrick.
" 18. *St. Martin.* Smallwood.
" 23. *Newberry.* Johnson.
" 24. *Hammerfest.* Noodt.
" 25. *St. Martin.* Smallwood.
Nov. 13. *Van Rensselaer Harbor.* Kane.
" 14. *Hammerfest.* Noodt.
" 15. *Hammerfest.* Noodt.
" 18. *Van Rensselaer Harbor.* Kane.
" 20. *Cambridge.* Bond. Lovering.
" 20. *Hammerfest.* Noodt.
" 22. *Van Rensselaer Harbor.* Kane.

Bull. de l'Acad. Brux. XXI. 551.

Dec. 8. *St. Martin.* Smallwood. *Hammerfest.* Noodt.
" 14. *Van Rensselaer Harbor.* Kane.
" 18. *St. Martin.* Smallwood. *Hammerfest.* Noodt.
" 22. *St. Martin.* Smallwood.
" 29. *Hammerfest.* Noodt.

1855.

Jan. 7. *Van Rensselaer Harbor.* Kane.
" 10. *Cambridge.* Bond. Lovering.
" 10. *Newberry.* Johnson. *St. Martin.* Smallwood.[1]
" 14. *Hammerfest.* Noodt.
Feb. 5. *Cambridge.* Bond. Lovering.
" 10. *Van Rensselaer Harbor.* Kane.
" 11. *St. Martin.* Smallwood.
" 12. *Cambridge.* Bond. Lovering.
" 12. *St. Martin.* Smallwood.
" 14. *Catharinebourg.* Kupffer.[2]
Mar. 8. *St. Martin.* Smallwood.
" 9. *St. Martin.* Smallwood.
" 12. *Cambridge.* Bond. Lovering.
" 12. *Newberry.* Johnson.[3] *New York.* Morris.
" 12. *Rochester.* Dewey. *St. Martin.* Smallwood.
" 18. *New York.* Morris. *St. Martin.* Smallwood.
" 19. *St. Martin.* Smallwood.
Apr. 7. *Cambridge.* Bond. Lovering.
" 9. *Cambridge.* Bond. Lovering.
" 9. *St. Martin.* Smallwood.
" 12. *Cambridge.* Bond. Lovering.
" 12. *Newberry.* Johnson. *New York.* Morris.
" 12. *St. Martin.* Smallwood.
" 14. *Cambridge.* Bond. Lovering.
" 15. *St. Martin.* Smallwood.
" 20. *St. Martin.* Smallwood.
May 1. *St. Martin.* Smallwood.
" 6. *St. Martin.* Smallwood.
" 9. *St. Martin.* Smallwood.
" 10. *Newberry.* Johnson. *New York.* Morris.
" 24. *St. Martin.* Smallwood.
July 7. *St. Martin.* Smallwood.
" 9. *St. Martin.* Smallwood.
" 16. *St. Martin.* Smallwood.
Aug. 5. *St. Martin.* Smallwood.
" 10. *St. Martin.* Smallwood.
" 17. *St. Martin.* Smallwood.
" 23. *St. Martin.* Smallwood.

[1] Amer. Journ. Sci. Second Series, XXI. 288.
[2] Annal. de l'Observ. Phys. Centrale de Russie, 1855, p. 127.
[3] Regents' Reports of the Univ. New York, 1856, p. 361.

Sept.10. *Cambridge.* Bond. Lovering.
" 10. *New York.* Morris.
" 11. *St. Martin.* Smallwood.
" 13. *St. Martin.* Smallwood.
" 17. *Cambridge.* Bond. Lovering.
Oct. 3. *St. Martin.* Smallwood.
" 4. *New York.* Morris. *Rochester.* Dewey.
" 8. *New York.* Morris.
" 9. *Cambridge.* Bond. Lovering.
" 9. *New York.* Morris.
" 10. *St. Martin.* Smallwood.
" 14. *Hammerfest.* Noodt.
" 16. *St. Martin.* Smallwood.
" 18. *Hammerfest.* Noodt.
" 20. *Hammerfest.* Noodt.
Nov. 2. *St. Martin.* Smallwood.
" 5. *St. Martin.* Smallwood.
" 8. *Hammerfest.* Noodt.
" 16. *Hammerfest.* Noodt.
" 19. *St. Martin.* Smallwood.
" 26. *Hammerfest.* Noodt.
" 29. *Cambridge.* Bond. Lovering.
" 29. *St. Martin.* Smallwood.
" 30. *St. Martin.* Smallwood. *Hammerfest.* Noodt.
Dec. 5. *St. Martin.* Smallwood.
" 7. *St. Martin.* Smallwood.
" 13. *St. Martin.* Smallwood.
" 30. *St. Martin.* Smallwood.

1856.

Jan. 29. *Hammerfest.* Noodt.
" 31. *Newberry.* Johnson.[2]
Feb. 6. *Hammerfest.* Noodt.
" 7. *Hammerfest.* Noodt.
Mar. 2. *Sponholz.* Jahn.
" 4. *Hammerfest.* Noodt.
" 11. *Senftenberg.* Brorsen. Jahn.
" 30. *Cambridge.* Bond. Lovering.
" 31. *Newberry.* Johnson.
Apr. 22. *Cambridge.* Bond. Lovering. *Sitka.* Kupffer.[1]
June 2. *Paris.* Boué.
" 4. *Paris.* Boué.
" 6. *Paris.* Boué.
Aug. 22. *Cambridge.* Bond. Lovering. *Sitka.* Kupffer.
" 24. *Cambridge.* Bond. Lovering.
" 31. *Cambridge.* Bond. Lovering.
" 31. *Millford, Illinois.* Hendrick.[2]

[1] Annal. de l'Observ. Phys. Centrale de Russie, 1856, p. 455.
[2] Regents' Reports of the Univ. New York, 1857, pp. 312 and 317.

Sept.22. *Hammerfest.* Noodt.
" 30. *Hammerfest.* Noodt.
Oct. 4. *Cambridge.* Bond. Lovering.
" 4. *Newberry.* Johnson.
" 5. *Hammerfest.* Noodt.
" 19 *Bamberg.* Ellner. Jahn.
" 23. *Providence.* Caswell. *Newberry.* Johnson.
" 23. *Bamberg.* Ellner. Jahn.
Nov. 20. *Cambridge.* Bond. Lovering.
" 23. *Newberry.* Johnson.
Dec. 3. *Sitka.* Kupffer. *Hammerfest.* Noodt.
" 4. *Hammerfest.* Noodt.
" 29. *Sitka.* Kupffer.

1857.

Jan. 16. *Hammerfest.* Noodt.
" 26. *Hammerfest.* Noodt.
Apr. 11. *Sitka.* Kupffer.[1]
" 13. *Newberry.* Johnson.
Sept. 1. *Worcester.* Bemis.[2]
" 3. *Providence, R. I.* Caswell.
" 7. *Cambridge.* Bond. Lovering.
" 8. *Cambridge.* Bond. Lovering.
" 10. *Cambridge.* Bond. Lovering.
" 10. *Newberry.* Johnson.
" 13. *Sitka.* Kupffer.
" 19. *Lat.* 75° *N. Long.* 66° *W.* M'Clintock.[3]
" 27. *Lat.* 75° *N. Long.* 65° *W.* M'Clintock.
Oct. 4. *Lat.* 75° *N. Long.* 66° *W.* M'Clintock.
" 9. *Lat.* 75° *N. Long.* 66° *W.* M'Clintock.
" 24. *Sitka.* Kupffer.
" 30. *Lat.* 75° *N. Long.* 69° *W.* M'Clintock.
Nov. 4. *Newberry.* Johnson.
" 7. *Lat.* 75° *N. Long.* 69° *W.* M'Clintock.
" 9. *Cambridge.* Bond. Lovering.
" 9. *Lat.* 75° *N. Long.* 69° *W.* M'Clintock.
" 10. *Bogoslowski.* Kupffer.
" 11. *Lat.* 75° *N. Long.* 68° *W.* M'Clintock.
" 17. *Cambridge.* Bond. Lovering.
" 23. *Lat.* 75° *N. Long.* 68° *W.* M'Clintock.
Dec. 4. *Newberry.* Johnson.
" 10. *Lat.* 75° *N. Long.* 68° *W.* M'Clintock.
" 12. *Lat.* 75° *N. Long.* 68° *W.* M'Clintock.
" 13. *Lat.* 75° *N. Long.* 68° *W.* M'Clintock.
" 14. *Lat.* 74° *N. Long.* 67° *W.* M'Clintock.

[1] Annal. de l'Observ. Phys. Centrale de Russie, 1857, pp. 385 et 513.
[2] Twenty-Fifth Report of the Lunatic Asylum, p. 76.
[3] Meteor. Papers of the Board of Trade, London, IV. 9.

Dec. 15. *Newberry.* Johnson.
" 16. *Sacramento, California.* Logan.[1]
" 16. *St. Petersburg.* Kupffer.[2]
" 16. *Lat.* 74° *N. Long.* 67° *W.* M'Clintock.
" 17. *Catharinebourg.* Kupffer.[2]
" 17. *Rochester, N. Y.* Dewey.
" 17. *Hammerfest.* Noodt. *Brussels.* Quetelet.[3]
" 17. *Lat.* 74° *N. Long.* 67° *W.* M'Clintock.
" 17. *Nertchinsk and Barnaoul.* Kupffer.[2]
" 20. *Cambridge.* Bond. Lovering.
" 20. *Newberry.* Johnson.
" 22. *Rochester, N. Y.* Dewey.

1858.

Jan. 1. *Hammerfest.* Noodt.
" 8. *Cambridge.* Bond. Lovering.
" 8. *Worcester.* Bemis.[4] *Providence.* Caswell.
" 8. *Newberry.* Johnson. *Rochester.* Dewey.[5]
" 8. *Catharinebourg.* Kupffer.[6]
" 9. *Lat.* 73° *N. Long.* 66° *W.* M'Clintock.
" 11. *Lat.* 73° *N. Long.* 64° *W.* M'Clintock.
" 12. *Cambridge?* Bond. Lovering.
" 12. *Rochester, N. Y.* Dewey.
" 12. *Lat.* 73° *N. Long.* 64° *W.* M'Clintock.
" 17. *Hammerfest.* Noodt.
" 17. *Lat.* 73° *N. Long.* 64° *W.* M'Clintock.
Feb. 2. *St. Petersburg.* Kupffer.[6] *Hammerfest.* Noodt.
" 2. *Lat.* 72° *N. Long.* 61° *W.* M'Clintock.
" 3. *Hammerfest.* Noodt.
" 3. *Lat.* 72° *N. Long.* 61° *W.* M'Clintock.
" 6. *Lat.* 72° *N. Long.* 61° *W.* M'Clintock.
" 7. *Lat.* 72° *N. Long.* 61° *W.* M'Clintock.
" 9. *Lat.* 72° *N. Long.* 61° *W.* M'Clintock.
" 10. *Lat.* 72° *N. Long.* 61° *W.* M'Clintock.
" 12. *Sitka.* Kupffer.
" 13. *Lat.* 72° *N. Long.* 6[illegible] *W.* M'Clintock.
" 14. *Hammerfest.* Noodt.
" 15. *Newberry* Johnson. *Sitka.* Kupffer.
" 15. *Lat.* 72° *N. Long.* 61° *W.* M'Clintock.
" 16. *Cambridge.* Bond. Lovering. *Sitka.* Kupffer.
" 16. *Lat.* 72° *N. Long.* 61° *W.* M'Clintock.

[1] Amer. Journ. Sci. Second Series, XXIX. 260.
[2] Annal. de l'Observ. Phys. Centrale de Russie, 1857, pp. 61, 147, 229, et 315.
[3] Bull. de l'Acad. Brux. Second Series, IV. 9.
[4] Twenty-Sixth Report of the Lunatic Asylum, p. 67.
[5] Reports of Regents of the Univ. New York, 1859, pp. 230 and 242.
[6] Annal. de l'Observ. Phys. Centrale de Russie, 1858, pp. 41, 127, et 451.

Feb. 17. *Rochester, N. Y.* Dewey.
" 17. *Lat.* 71° *N. Long.* 61° *W.* M'Clintock.
" 18. *Lat.* 71° *N. Long.* 61° *W.* M'Clintock.
" 19. *Lat.* 71° *N. Long.* 61° *W.* M'Clintock.
Mar. 1. *St. Petersburg. Bogoslowski.* Kupffer.[1]
" 2. *Lat.* 70° *N. Long.* 60° *W.* M'Clintock.
" 3. *St. Petersburg.* Kupffer.
" 4. *Lat.* 70° *N. Long.* 60° *W.* M'Clintock.
" 5. *Lat.* 70° *N. Long.* 60° *W.* M'Clintock.
" 6. *Lat.* 70° *N. Long.* 60° *W.* M'Clintock.
" 8. *Lat.* 70° *N. Long.* 60° *W.* M'Clintock.
" 12. *Worcester.* Bemis. *Sitka.* Kupffer.
" 13. *Cambridge.* Bond. Lovering.
" 13. *Worcester.* Bemis.
" 13. *Newberry.* Johnson. *Providence.* Caswell.
" 13. *Hammerfest.* Noodt.
" 13. *Lat.* 72° *N. Long.* 60° *W.* M'Clintock.
" 14. *Armagh.* Robinson.[2] *Tobolsk.* Kupffer.
" 14. *Hammerfest.* Noodt.
" 15. *Lat.* 70° *N. Long.* 60° *W.* M'Clintock.
" 16. *Lat.* 70° *N. Long.* 59° *W.* M'Clintock.
" 17. *Lat.* 70° *N. Long.* 59° *W.* M'Clintock.
" 18. *Lat.* 70° *N. Long.* 59° *W.* M'Clintock.
" 28. *Sitka.* Kupffer.
" 30. *Sitka.* Kupffer.
" 31. *Sitka.* Kupffer.
Apr. 1. *Lat.* 68° *N. Long.* 59° *W.* M'Clintock.
" 2. *Newberry.* Johnson.
" 3. *Newberry.* Johnson.
" 9. *Worcester.* Bemis.
" 9. *Tasmania.* Abbott.[3] *Tobolsk.* Kupffer.
" 9. *Munster.* Heis. *Christiania.* Hansteen.[4]
" 10. *Cambridge.* Bond. Lovering.
" 10. *Worcester.* Bemis. *Providence.* Caswell.
" 10. *Newberry.* Johnson. *Melbourne.* Neumaier.[4]
" 11. *Cambridge.* Bond. Lovering.
" 11. *Newberry.* Johnson. *Tobolsk.* Kupffer.
" 11. *Tasmania.* Abbott.
" 11. *Lat.* 67° *N. Long.* 59° *W.* M'Clintock.
" 12. *Lat.* 67° *N. Long.* 58° *W.* M'Clintock.
" 14. *Cambridge.* Bond. Lovering.
" 14. *Lat.* 66° *N. Long.* 58° *W.* M'Clintock.
" 15. *Lat.* 66° *N. Long.* 58° *W.* M'Clintock.
May 7. *Newberry.* Johnson. *Rochester.* Dewey.
" 8. *Sitka.* Kupffer. *Tasmania.* Abbott.

[1] Annal. de l'Observ. Phys. Centrale de Russie, 1859, p. 507.
[2] Phil. Mag. Fourth Series, XV. 326.
[3] Papers and Proc. Roy. Soc. Tasmania, III. Pt. II.
[4] Bull. de l'Acad. Brux. VI. 365.

July 1. *Cambridge.* Bond. Lovering.
" 2. *Cambridge.* Bond. Lovering.
Aug. 20. *Christiania.* Hansteen. *Sitka.* Kupffer.
" 21. *Christiania.* Hansteen.
" 30. *Cambridge.* Bond. Lovering.
" 31. *Cambridge.* Bond. Lovering.
Sept. 1. *Cambridge.* Bond. Lovering.
" 7. *Cambridge.* Bond. Lovering.
" 7. *Worcester.* Bemis.
" 7. *Newberry.* Johnson. [illegible]
" 8. [illegible]
" 8. *Newberry.* Johnson.
" 12. *Worcester.* Bemis. *Newberry.* Johnson.
" 14. *Cambridge.* Bond. Lovering.
Oct. 2. *Cambridge.* Bond. Lovering.
" 2. *Worcester.* Bemis.
" 2. *Newberry.* Johnson. *Sitka.* Kupffer.
" 4. *Cambridge.* Bond. Lovering.
" 6. *Worcester.* Bemis. *Newberry.* Johnson.
" 8. *Cambridge.* Bond. Lovering.
" 8. *Newberry.* Johnson. *Rochester.* Dewey.
" 9. *Cambridge.* Bond. Lovering.
" 9. *Worcester.* Bemis. *Rochester.* Dewey.
" 13. *Cambridge.* Bond. Lovering.
" 14. *Worcester.* Bemis.
" 21. *Cambridge.* Bond. Lovering.
" 21. *Worcester.* Bemis. *Providence.* Caswell.
" 21. *Newberry.* Johnson. *California.* Logan.
" 28. *Port Kennedy.* M'Clintock.
" 29. *Port Kennedy.* M'Clintock. *Sitka.* Kupffer.
" 30. *Port Kennedy.* M'Clintock.
" 31. *Cambridge.* Bond. Lovering.
" 31. *Worcester.* Bemis.
" 31. *Port Kennedy.* M'Clintock.
Nov. 1. *Cambridge.* Bond. Lovering.
" 6. *Port Kennedy.* M'Clintock.
" 7. *Port Kennedy.* M'Clintock.
" 9. *Port Kennedy.* M'Clintock.
" 12. *Port Kennedy.* M'Clintock.
" 13. *Sitka.* Kupffer. *Port Kennedy.* M'Clintock.
Dec. 1. *Cambridge.* Bond. Lovering.
" 2. *Sitka.* Kupffer.
" 3. *Port Kennedy.* M'Clintock.
" 4. *Rochester.* Dewey. *Munster.* Heis. *England.*
" 4. *Sitka.* Kupffer. *Port Kennedy.* M'Clintock.
" 5. *Rochester.* Dewey. *Port Kennedy.* M'Clintock.
" 5. *Hammerfest.* Noodt. *Port Kennedy.* M'Clintock.
" 8. *Port Kennedy.* M'Clintock.
" 10. *Sitka.* Kupffer.
" 11. *Port Kennedy.* M'Clintock.
Dec. 13. *Port Kennedy.* M'Clintock.
" 14. *Port Kennedy.* M'Clintock.
" 15. *Port Kennedy.* M'Clintock.
" 23. *Sitka.* Kupffer.
" 24. *Worcester.* Bemis.
" 24. *Port Kennedy.* M'Clintock.
" 24. *Catharinebourg.* Kupffer.
" 28. *Port Kennedy.* M'Clintock.
" 30. *Port Kennedy.* M'Clintock.

1859.

Jan. 1. *Port Kennedy.* M'Clintock.
" 2. *Port Kennedy.* M'Clintock.
" 3. *Port Kennedy.* M'Clintock.
" 8. *Port Kennedy.* M'Clintock.
" 9. *Port Kennedy.* M'Clintock.
" 10. *Newberry.* Johnson. *Port Kennedy.* M'Clintock.
" 11. *Port Kennedy.* M'Clintock.
" 27. *Hammerfest.* Noodt.
" 31. *Port Kennedy.* M'Clintock.
Feb. 1. *Port Kennedy.* M'Clintock.
" 8. *Port Kennedy.* M'Clintock.
" 9. *Port Kennedy.* M'Clintock.
" 9. *Sitka and Tobolsk.* Kupffer.[1]
" 10. *Port Kennedy.* M'Clintock.
" 20. *Port Kennedy.* M'Clintock.
" 22. *Cambridge.* Bond. Lovering.
" 22. *Newberry.* Johnson. *Providence.* Caswell.
" 23. *Cambridge.* Bond. Lovering.
" 25. *Munster.* Heis.[2] *Sitka.* Kupffer.
" 25. *Port Kennedy.* M'Clintock.
" 24. *Newberry.* Johnson.
" 25. *Port Kennedy.* M'Clintock.
" 26. *St. Petersburg.* Kupffer.[3]
" 26. *Catharinebourg.* Kupffer.[3]
Mar. 2. *Hammerfest.* Noodt.
" 5. *Hammerfest.* Noodt.
" 6. *Port Kennedy.* M'Clintock.
" 11. *Newberry.* Johnson. *Hammerfest.* Noodt.
" 26. *Worcester.* Bemis. *Sitka.* Kupffer.
" 30. *Worcester.* Bemis. *Port Kennedy.* M'Clintock.
Apr. 2. *Sitka.* Kupffer.
" 6. *Newberry.* Johnson.
" 12. *St. Petersburg.* Kupffer.
" 20. *Barnaoul.* Kupffer.

[1] Annal. de l'Observ. Phys. Centrale de Russie, 1859, p. 451, et Suppl. p. 170.
[2] Bull. de l'Acad. Brux. Second Series, VII. 360.
[3] Annal. de l'Observ. Phys. Centrale de Russie, 1859, pp. 41, 127, 217, et 389.

Apr. 21. *Newberry. Johnson. Brussels. Quetelet.*[1]
" 21. *St. Petersburg and Zlatooust. Kupffer.*
" 22. *Munster. Heis.*
" 23. *Germany, France, Belgium. Heis.*
" 25. *Worcester. Bemis. Newberry. Johnson.*
" 25. *Cambridge. Bond. Lovering.*
" 25. *Worcester. Bemis.*
" 25. *New Haven. Herrick. Newton and Loomis.*[2]
" 25. *Newberry. Johnson. Providence. Caswell.*
May 7. *Newberry. Johnson.*
May 22. *Cambridge. Bond. Lovering.*
Aug. 21. *Worcester. Bemis.*
" 23. *Cambridge. Bond. Lovering.*
" 23. *Providence. Caswell. Newberry. Johnson.*
" 23. *Rochester. Dewey. Toronto. Kingston.*
" 23. *Worcester. Bemis.*
" 23. *Maine. Loomis. New Haven. Lyman.*[3]
" 23. *California. Logan. Illinois. Vandeliver.*
" 23. *Cleveland, Ohio. Steward. Loomis.*
" 23. *Camp Himealaman, Wash. Ter. Campbell.*[4]
" 23. *Hamilton, C. W. Hartman. Loomis.*
" 23. *Melbourne. Neumayer. Munster. Heis.*
" 23. *Havana, Cuba. Poey. Key West.*[5] *Dennis.*
" 23. *Canbe-Varia. Denza.*[6] *Germany.*
" 23. *St. Petersburg and Sitka. Kupffer.*
" 24. *Cambridge. Bond. Lovering.*
" 24. *Worcester.*[7] *Toronto. Kingston.*
" 24. *Rochester. Dewey. Havana. Poey.*[8]
" 24. *Providence. Caswell. Germany. Heis.*
" 24. *Camp Himealaman. Campbell. Loomis.*
" 25. *Camp Himealaman. Campbell. Loomis.*
Sept. 1. *Indiana. Kirkwood. Rochester. Dewey.*
" 1. *Toronto. Kingston. Cuba. Poey.*
" 1. *Fort Bridger, Utah Ter. Eyland. Loomis.*
" 1. *California. Logan. Santiago. Mussa.*
" 1. *Sitka. Kupffer.*
" 2. *Cambridge. Bond. Lovering.*
" 2. *Worcester. Bemis.*
" 2. *Providence. Caswell. Toronto. Kingston.*
" 2. *Newberry. Johnson. Rome, N. Y. Huntington.*
" 2. *Rochester? Dewey. Porto Rico. DuChaillu.*
" 2. *Cleveland, Ohio. Steward. Loomis.*
" 2. *Melbourne. Neumayer. Key West. Dennis.*

Sept. 2. *Athens, Greece. Schmidt.*[9]
" 2. *Near Cape Horn. Schumacher. Loomis.*
" 2. *St. Petersburg and Barnaul. Kupffer.*
" 2. *Catharinaburg. Kupffer.*
" 2. *Bertchinsk and Irkutsk. Kupffer.*[10]
" 3. *Newberry. Johnson. Rochester. Dewey.*
" 3. *Toronto. Kingston.*[11]
" 3. *Tobolsk and Irkutsk. Kupffer.*
" 3. *Athens, Greece. Schmidt.*
" 3. *New Haven. Lyman. Toronto. Kingston.*
" 3. *Toronto. Kingston. Munster. Heis.*
" 21. *Cape Town. Munster.*
" 22. *Cambridge. Bond. Lovering.*
" 23. *Munster. Heis.*
" 23. *Munster. Heis.*
" 24. *Cambridge. Bond. Lovering.*
" 24. *Worcester. Bemis.*
" 2. *Sandwich Islands. Loomis.*[12]
Oct. 1. *Cambridge. Bond. Lovering.*
" 1. *Providence. Caswell. Munster. Heis.*
" 2. *Newberry. Johnson.*
" 2. *Hammerfest. Nordt. Bogoslowski. Kupffer.*[13]
" 12. *Cambridge. Bond. Lovering. Schmidt.*
" 12. *Westphalia. Heis. Posen. Spitler.*[14]
" 12. *Catharinaburg and Irkutsk. Kupffer.*
" 12. *The Jura. Dewey. Bertchinsk. Kupffer.*
" 16. *Sitka. Kupffer.*
" 17. *Sitka. Kupffer.*
" 19. *Cambridge. Bond. Lovering.*
" 19. *Providence. Caswell. California. Logan.*
" 19. *Bertchinsk. Kupffer.*
" 19. *Sitka. Kupffer.*
" 21. *Cambridge. Bond. Lovering.*
" 21. *Worcester. Bemis.*
" 21. *Providence. Caswell. Sitka. Kupffer.*
" 21. *Cambridge. Bond. Lovering.*
" 21. *Worcester. Bemis. Providence.*
" 21. *Hammerfest. Nordt.*
" 22. *Sitka. Kupffer.*
Nov. 8. *Hammerfest. Nordt.*
" 11. *Sitka. Kupffer.*
" 13. *Hammerfest. Nordt.*
" 14. *Sitka. Kupffer.*

[1] Bull. de l'Acad. Roy. Second Series, VII. 72.
[2] Amer. Journ. Sci. Second Series, XXVIII. 156, 281, &c.
[3] Amer. Journ. Sci. Second Series, XXX. 82, and XXXII. 162.
[4] Amer. Journ. Sci. Second Series, XXIX. 260.
[5] Bull. Soc. Sci. Nat. Neufchatel, V. 247.
[6] Twenty-seventh Report of the Lunatic Asylum, p. 71.
[7] Amer. Journ. Sci. Second Series, XXVIII. 406.
[8] Amer. Journ. Sci. Second Series, XXX. 82.
[9] Annal. de l'Observ. Phys. Centrale de Russie, 1859, pp. 231, et 257.
[10] Amer. Journ. Sci. Second Series, XXVIII. 282.
[11] Amer. Journ. Sci. Second Series, XXX. 82.
Annal. de l'Observ. Phys. Centrale de Russie, 1859, p. 242
[12] Mittheil. aus dem Gebiete. XXV. 82.

Dec. 13. *Catharinebourg. Zlatoouste.* Kupffer.
" 14. *Cambridge.* Bond. Lovering. *Sitka.* Kupffer.
" 15. *Marquette, Lake Superior.* Dewey.[1]
" 15. *Hammerfest.* Noodt.
" 16. *Hammerfest.* Noodt.
" 21. *Hammerfest.* Noodt.
" 23. *Hammerfest.* Noodt.
" 26. *Newberry.* Johnson.
" 30. *Hammerfest.* Noodt.

1860.

Jan. 14. *Haparanda, Sweden.* Böhm.[2]
" 15. *Cambridge.* Bond. Lovering. *Dorpat.* Böhm.
" 20. *Hammerfest.* Noodt.
" 21. *Haparanda.* Böhm. *Hammerfest.* Noodt.
" 22. *Haparanda.* Böhm.
Feb. 10. *Bogoslowski.* Kupffer.[3] *Hammerfest.* Noodt.
" 11. *Haparanda.* Böhm.
" 12. *Haparanda. Peckeloh.* Böhm.
" 17. *Newberry.* Johnson.
" 21. *Worcester.* Bemis.
" 21. *Newberry.* Johnson. *Providence.* Caswell.
" 22. *Stockholm. St. Petersburg. Reval.* Böhm.
Mar. 10. *Zlatoouste.* Kupffer.[3]
" 12. *Bogoslowski.* Kupffer. *Haparanda.* Böhm.
" 12. *Copenhagen. Stockholm.* Böhm.
" 13. *Haparanda.* Böhm.
" 14. *Newberry.* Johnson. *Sitka.* Kupffer.[3]
" 16. *Sitka.* Kupffer.
" 17. *Worcester.* Bemis. *Newberry.* Johnson.
" 18. *Worcester.* Bemis.
" 18. *Newberry.* Johnson. *Bogoslowski.* Kupffer.
" 19. *Worcester.* Bemis.
" 20. *Bogoslowski.* Kupffer.
" 21. *Cuba.* Böhm.
" 26. *Worcester.* Bemis. *Providence.* Caswell.
" 27. *Cambridge.* Bond. Lovering.
" 27. *Worcester.* Bemis.
" 28. *Bogoslowski.* Kupffer.
" 29. *Catharinebourg*[3] *and Bogoslowski.* Kupffer.
" 29. *Stockholm.* Böhm.
Apr. 9. *Newberry.* Johnson.[4] *Bogoslowski.* Kupffer.
" 9. *Copenhagen. Paris. Dorpat.* Böhm.
" 12. *Worcester.*[5] Bemis.
" 12. *Hamburg and Haparanda.* Böhm.
Apr. 13. *Cambridge.* Bond. Lovering. *Worcester.* Bemis.
" 13. *Newberry.* Johnson. *Providence.* Caswell.
" 13. *Hamburg and Haparanda.* Böhm.
" 14. *Cambridge.* Bond. Lovering.
" 15. *Worcester.* Bemis.
" 18. *Worcester.* Bemis.
May 6. *St. Petersburg.* Kupffer.[1]
June 22. *Lougan.* Kupffer.[2]
" 30. *Worcester.* Bemis.
July 4. *Sacramento, Cal.* Logan.[3]
" 17. *Newberry.* Johnson.
" 19. *Cambridge.* Bond. Lovering.
" 19. *Worcester.* Bemis. *Newberry.* Johnson.
Aug. 6. *Worcester.* Bemis.
" 7. *Prague. Vienna. Berlin.* Böhm.
" 8 *Chicago, Illinois.* Bradley.[3]
" 8. *Naugard and Athens.* Böhm.
" 8. *Zlatoouste and Lougan.* Kupffer.
" 9. *New Haven.* Herrick.[4]
" 9. *Prussia. France. Greece.* Heis.[5] Böhm.
" 10. *New Haven.* Herrick. *Chicago.* Bradley.
" 10. *Paris.* Heis. *Norderney.* Böhm.
" 10. *St. Petersburg.* Kupffer.
" 11. *Prague and Peckeloh.* Böhm.
" 12. *Chicago.* Bradley. *Bogoslowski.* Kupffer.
" 12. *Prague.* Heis. *Catharinebourg.* Kupffer.
" 12. *Paris. Kremsmunster, &c.* Böhm.
" 13. *Emden and Westphalia.* Heis. Böhm.
" 14. *Athens.* Heis. Böhm.
" 16. *Worcester.* Bemis. *Newberry.* Johnson.
" 17. *Chicago, Illinois.* Bradley.
" 18. *Worcester.* Bemis. *Stockholm.* Böhm.
" 22. *Newberry.* Johnson.[6]
" 25. *Westphalia.* Böhm.
" 27. *Westphalia.* Böhm.
" 30. *Gouda, Netherlands.* Böhm.
Sept. 6. *Cambridge.* Bond. Lovering.
" 6. *Worcester.* Bemis. *Newberry.* Johnson.
" 6. *Utrecht, Stockholm, Peckeloh.* Böhm.
" 7. *New Haven.* Herrick.[7] *Sitka.* Kupffer.
" 7. *Stockholm and Leipsic.* Böhm.
" 8. *Peckeloh.* Böhm.
" 10. *Stockholm and Haparanda.* Böhm.
" 15. *Worcester.* Bemis.

[1] Reports of Regents of Univ. New York, 1860, p. 229.
[2] Magnet. and Meteor. Beobacht. zu Prag. XXI. Jahr. p. IX.
[3] Annal. de l'Observ. Phys. Centrale de Russie, 1860, pp. 131, 385, 505, et 539.
[4] Reports of Regents of Univ. New York, 1863, p. 415.
[5] Twenty-eighth Report of the Lunatic Asylum, p. 68.

[1] Annal. de l'Observ. Phys. Centrale de Russie, 1860, p. 49.
[2] Annal. de l'Observ. Phys. Centrale de Russie, 1860, p. 573.
[3] Amer. Jour. Sci. Second Series, XXXI. 136, and XXXII. 148.
[4] Amer. Jour. Sci. Second Series, XXX. 298.
[5] Bull. de l'Acad. Brux. X. 417 et 422.
[6] Aurora Australis.
[7] Bull. de l'Acad. Brux. Second Series, X. 420.

Sept. 16. *Cambridge.* Bond. Lovering.
" 17. *Newberry.* Johnson.
" 25. *Worcester.* Bemis.
Oct. 1. *Kreuznach, Prussia.* Böhm.
" 8. *Worcester.* Bemis.
" 11. *Cambridge.* Bond. Lovering.
" 25. *Hammerfest.* Noodt.
" 29. *Haparanda.* Böhm.
Nov. 4. *Cambridge.* Bond. Lovering.
" 4. *Worcester.* Bemis.
" 13. *Zlatoouste.* Kupffer.
" 27. *Hammerfest.* Noodt.
" 29. *Hammerfest.* Noodt.
Dec. 8. *Munster.* Heis. *Peckeloh.* Böhm.
" 9. *Hammerfest.* Noodt.
" 10. *Catharinebourg.* Kupffer.
" 10. *St. Petersburg.* Kupffer.
" 15. *Worcester.* Bemis.
" 15. *Catharinebourg.* Kupffer.
" 18. *Hammerfest.* Noodt.

1861.

Jan. 2. *Hammerfest.* Noodt.
" 7. *Zlatoouste.* Kupffer.
" 12. *Worcester.* Bemis.[1]
" 13. *Cambridge.* Bond. Lovering.
" 22. *Cambridge.* Bond. Lovering.
" 22. *Munster and Peckeloh.* Heis. *Dorpat.* Böhm.[2]
" 22. *Locle.* Kopp.[3] *Elberfeld.* Böhm.
" 31. *Cambridge.* Bond. Lovering.
" 31. *Worcester.* Bemis.
Feb. 2. *Peckeloh.* Heis.
" 3. *Hammerfest.* Noodt.
" 12. *Prague.* Böhm.
" 16. *Hammerfest.* Noodt.
" 20. *Hammerfest.* Noodt.
" 27. *Cambridge.* Bond. Lovering.
" 27. *Worcester.* Bemis. *Newberry.* Johnson.
" 27. *Rochester.* Dewey.[4] *Prague.* Böhm.
" 28. *Rochester.* Dewey.
Mar. 1. *Haparanda.* Böhm.
" 2. *Peckeloh.* Böhm.
" 4. *Athens.* Heis.[5]
" 5. *Rochester.* Dewey. *Hammerfest.* Noodt.
" 9. *Cambridge.* Bond. Lovering.
" 9. *Neuchatel.* Kopp.[3] *Brussels.* Quetelet.[5]

[1] Twenty-ninth Report of the Lunatic Asylum, p. 61.
[2] Magnet. und Meteor. Beobacht. zu Prag. XXII. Jahr. p. XII.
[3] Bull. Soc. Sci. Nat. Neuchatel. VI. 237.
[4] Reports of Regents of the Univ. New York, 1862, pp. 412, 421.
[5] Bull. de l'Acad. Brux. XI. 317 et 644.

Mar. 9. *St. Petersburg.* Kupffer.[1] *Munster.* Heis.
" 9. *Haparanda and Stockholm.* Böhm.
" 9. *Greenwich. Paris. Cracow.* Böhm.
" 9. *Prague. Berlin. Dorpat.* Böhm.
" 11. *Newberry.* Johnson.
" 13. *Stockholm.* Böhm.
" 14. *Stockholm.* Böhm.
" 17. *Haparanda.* Böhm.
" 19. *Jicin.* Böhm.
" 25. *Stockholm and Prague.* Böhm.
" 26. *Stockholm.* Böhm.
" 28. *Newberry.* Johnson.
Apr. 7. *Sitka.* Kupffer.[2]
" 11. *Newberry.* Johnson.
" 15. *Haparanda and Munster.* Böhm.
" 15. *Peckeloh and Berlin.* Böhm.
June 12. *Worcester.* Bemis.
Aug. 1. *Rochester.* Dewey.
" 5. *Cambridge.* Bond. Lovering.
" 22. *Near Lake Superior.* Sand. Rive.[3]
Sept. 8. *Worcester.* Bemis.
" 15. *Worcester.* Bemis. *Newberry.* Johnson.
Oct. 10. *Newberry.* Johnson. *Rochester.* Dewey.
" 24. *Worcester.* Bemis.
" 25. *Newberry.* Johnson.
" 27. *Newberry.* Johnson.
Nov. 5. *Peckeloh.* Böhm.
" 7. *Lichtenberg, Peckeloh, &c.* Böhm.
Dec. 1. *Christiania.* Hansteen.[4]
" 4. *Stockholm. Peckeloh.* Böhm.
" 5. *Christiania.* Hansteen.
" 18. *Christiania.* Hansteen.
" 19. *Christiania. Dorpat. Dresden.* Böhm.
" 29. *Haparanda.* Ballot.[4]

1862.

Jan. 1. *Christiania.* Ballot.
" 2. *Haparanda.* Ballot.
" 31. *Stockholm.* Ballot.[4]
Feb. 1. *Christiania.* Hansteen.
" 2. *Christiania.* Hansteen.
" 7. *Stockholm.* Ballot.
" 28. *Christiania.* Hansteen.
Mar. 1. *Stockholm.* Ballot.
" 3. *Haparanda.* Ballot.

[1] Annal. de l'Observ. Phys. Centrale de Russie, 1861, pp. 45 et 537.
[2] Annal. de l'Observ. Phys. Centrale de Russie, 1861, p. 455.
[3] Mém. de la Soc. de Phys. Geneva, XVI. 330.
[4] Nederlandsch. Meteorol Jaarboek. 1862, p. 319.

Mar. 7. *Christiania.* Hansteen.
" 15. *Christiania.* Hansteen.
Apr. 27. *Newberry.* Johnson.[1]
May 14. *Christiania.* Hansteen.
July 27. *Leipsic.* Ballot.
Aug. 4. *Worcester.* Bemis.[2] *Christiania.* Hansteen.
" 14. *Worcester.* Bemis.
" 18. *Worcester.* Bemis.
" 22. *Newberry.* Johnson.
" 28. *Worcester.* Bemis. *Christiania.* Hansteen.
" 29. *Worcester.* Bemis. *Newberry.* Johnson.
" 30. *Worcester.* Bemis. *Newberry.* Johnson.
Sept. 1. *Christiania.* Hansteen.
" 11. *St. Petersburg and Dorpat.* Ballot.
" 17. *Christiania.* Hansteen.
" 20. *Haparanda.* Ballot.
" 21. *Christiania.* Hansteen.
" 23. *Christiania.* Ballot.
" 24. *Worcester.* Bemis. *Christiania.* Hansteen.
" 25. *Worcester.* Bemis. *Newberry.* Johnson.
" 25. *Christiania.* Hansteen.
" 26. *Newberry.* Johnson. *Christiania.* Hansteen.
" 27. *Worcester.* Bemis.
Oct. 3. *Christiania.* Hansteen.
" 4. *Christiania.* Hansteen. *Petersburg.* Ballot.
" 10. *Reval, Russia.* Iwanoff.[3]
" 11. *Montpellier.* Ballot.
" 14. *Stockholm.* Ballot.
" 23. *Christiania.* Hansteen.
" 26. *Cherbourg?* Ballot.
" 29. *Christiania.* Hansteen.
" 30. *Christiania.* Hansteen.
Nov. 10. *Christiania.* Hansteen.
" 17. *Christiania.* Hansteen.
Dec. 14. *Neuchatel.* Hirsch.[4] *Brussels.* Quetelet.[5]
" 14. *Christiania and Europe generally.* Ballot.
" 23. *Newberry.* Johnson.
" 24. *Worcester.* Bemis.[6] *Christiania.* Hansteen.
" 26. *Christiania.* Hansteen.

1863.

Jan. 25. *Christiania.* Hansteen.
Jan. 26. *Christiania.* Hansteen.
" 28. *Christiania.* Hansteen.
Feb. 7. *Christiania.* Hansteen.
" 8. *Worcester.* Bemis. *Christiania.* Hansteen.
" 22. *Christiania.* Hansteen. *Stockholm.* Ballot.[1]
" 23. *Christiania.* Hansteen.
" 24. *Christiania.* Hansteen.
" 25. *Christiania.* Hansteen. *Stockholm.* Ballot.
" 26. *Christiania.* Hansteen.
Mar. 21. *Christiania.* Hansteen.
" 22. *Worcester.* Bemis. *Christiania.* Hansteen.
" 24. *Christiania.* Hansteen.
Apr. 9. *Worcester.* Bemis. *New Haven.*[2]
" 9. *Newburyport, Mass.* Perkins.
" 9. *Christiania.* Hansteen. *Stockholm.* Ballot.
" 15. *Christiania.* Hansteen.
" 16. *Christiania.* Hansteen.
" 17. *Christiania.* Hansteen.
" 19. *Worcester.* Bemis.
" 21. *Worcester.* Bemis.
" 21. *Christiania.* Hansteen. *Munster.* Heis.
" 24. *Christiania.* Hansteen.
May 8. *Worcester.* Bemis.
Aug. 14. *Christiania.* Hansteen.
Sept. 9. *Worcester.* Bemis.
" 23. *Worcester.* Bemis.
" 24. *Christiania.* Hansteen.
" 25. *Christiania.* Hansteen.
Oct. 5. *Haparanda.* Ballot.
" 7. *Christiania.* Hansteen.
" 9. *Haparanda.* Ballot.
" 10. *Christiania.* Hansteen.
" 17. *Christiania.* Hansteen.
" 20. *Christiania.* Hansteen.
Nov. 5. *Christiania.* Hansteen.
" 13. *Christiania.* Hansteen.
" 14. *Christiania.* Hansteen.

1864.

June 7. *Cambridge.* Lovering.
Aug. 14. *Campton, New Hampshire.* Lovering.
Sept. 20. *Cambridge.* Bond. Lovering.
Nov. 19. *Cambridge.* Lovering.

[1] Reports of Regents of the Univ. New York, 1863, p. 415.
[2] Thirtieth Report of the Lunatic Asylum, p. 116.
[3] Corr. Annuell. des Mines de Russie, 1860, p. xxviii.
[4] Bull. Soc. Sci. Nat. Neuchatel. VI. 279.
[5] Annuaire de l'Observ. Royal de Brux. 1864, p. 200.
[6] Thirty-first Report of the Lunatic Asylum, p. 68.

[1] Nederlandsch. Meteorol. Jaarboek. 1863, p. 319.
[2] Amer. Journ. Sci. Second Series, XXXV. 462.

TABLES.

I. AURORAS OBSERVED AT CAMBRIDGE, MASS., ARRANGED BY YEARS AND MONTHS.

Year.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1742	.	.	.	.	.	.	.	.	.	.	.	2	2
1743	1	.	.	.	.	.	.	.	.	.	1	.	2
1744–5	.	.	.	.	.	.	.	.		.	.	.	0
1746	.	.	3	.	.	2	1	.	.	.	.	1	7
1747	1	2	.	.	1	.	1	2	2	.	.	1	10
1748	.	1	.	1	.	.	.	1	.	.	1	2	6
1749	.	1	1	2	1	1	.	.	1	1	2	.	10
1750	2	2	2	4	1	.	2	1	1	.	2	.	17
1751	.	3	.	1	.	1	.	.	.	.	.	.	5
1752	1	.	.	.	.	.	.	.	.	1	.	.	2
1753	.	.	.	1	.	.	.	.	.	.	.	.	1
1754–6	.	.	.	.	.	.	.	.	.	.	.	.	0
1757	.	.	.	.	.	.	.	1	3	.	2	.	6
1758	1	.	2	1	.	.	.	.	.	.	.	.	4
1759	.	.	1	.	.	.	.	.	3	1	.	.	5
1760	.	.	1	.	1	.	.	.	1	2	1	.	6
1761	.	.	2	.	.	.	.	.	1	.	2	.	5
1762	.	1	.	.	1	.	.	3	1	.	.	1	7
1763	.	.	.	1	1	.	1	1	1	.	1	.	6
1764	.	1	1	.	1	3	1	1	3	.	.	.	11
1765	.	1	.	.	.	.	2	3	.	1	.	.	7
1766	.	.	.	.	.	.	.	.	.	.	.	.	0
1767	.	.	.	.	.	.	2	1	.	.	.	.	3
1768	.	1	.	.	.	.	1	1	1	1	.	1	6
1769	1	1	.	.	.	3	3	1	1	5	.	1	16
1770	2	1	1	1	1	.	4	2	2	.	.	.	14
1771	.	1	2	.	.	2	.	2	2	2	3	1	15
1772	.	.	1	.	1	.	.	4	.	.	1	.	7
1773	2	.	2	.	1	5	4	2	.	.	.	.	16
1774	.	1	1	1	.	1	5	2	2	.	2	.	15
1775	1	2	1	.	.	.	1	.	.	.	.	.	5
1776	.	.	.	1	.	.	.	.	3	.	.	.	4
1777	1	.	1	2	.	1	1	.	2	1	3	2	14
1778	1	2	3	3	1	2	2	.	2	.	.	.	16
1779	.	3	.	1	.	.	.	.	.	.	.	.	4
1781	.	.	1	.	.	.	.	.	.	.	.	.	1
1782	.	.	.	.	.	.	.	.	3	3	1	.	7
1783	1	2	5	3	3	.	.	.	.	.	.	.	14
1784	.	.	.	.	.	1	.	.	1	.	1	1	4
1785	.	.	.	.	1	.	.	.	1	1	2	1	6
1786	.	1	7	3	1	1	6	2	2	3	2	.	28
1787	1	1	2	2	2	3	2	3	2	4	3	2	27
1788	1	1	2	2	1	.	3	5	7	4	.	.	26
1789	.	2	3	3	5	.	2	2	.	2	1	1	21
1790	.	.	.	.	.	.	.	.	.	.	.	.	0
1791	.	.	.	.	.	.	.	.	.	.	.	.	0
1792	.	.	.	.	.	.	.	.	.	.	.	.	0
1793	.	.	1	.	.	.	.	.	1	.	.	.	2
Total	17	31	46	33	24	26	44	40	49	32	31	17	390

II. AURORAS OBSERVED AT CAMBRIDGE, MASS., ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1840	.	2	2	1	.	2	1	1	1	.	.	.	10
1841	2	3	8	5	1	.	2	.	1	4	.	2	28
1842	2	.	1	2	.	.	1	.	1	.	1	1	9
1843	.	.	.	.	.	.	.	1	2	1	1	.	5
1844	.	.	.	2	1	.	.	1	.	1	.	1	6
1845	1	.	.	1	.	.	.	.	2	1	.	2	7
1846	.	.	.	2	1	.	1	2	4	3	.	1	14
1847	.	1	2	2	1	.	.	2	1	.	.	.	9
1848	1	2	4	3	2	.	2	.	.	2	3	1	20
1849	.	1	1	.	1	.	1	.	.	.	.	.	4
1850	.	.	4	3	1	.	2	3	.	.	.	1	14
1851	.	2	1	.	1	2	2	1	2	.	.	.	11
1852	1	4	1	1	4	1	9	1	9	3	4	6	44
1853	2	2	4	3	4	4	2	.	4	2	1	1	29
1854	3	4	4	3	4	1	2	.	3	1	1	.	26
1855	1	2	1	4	.	.	.	.	2	1	1	.	12
1856	.	.	1	1	.	.	.	3	.	1	1	.	7
1857	.	.	.	.	.	.	.	.	3	.	2	1	6
1858	2	1	1	3	.	.	2	2	4	7	1	1	24
1859	.	2	.	1	.	.	1	2	3	5	.	1	15
1860	1	.	1	2	.	.	1	.	2	1	1	.	9
1861	3	1	1	.	.	.	.	1	.	.	.	.	6
1862–3	.	.	.	.	.	.	.	.	.	.	.	.	0
1864	.	.	.	.	.	.	.	.	1	.	.	.	1
Total	19	27	37	39	21	10	29	20	45	33	17	19	316

III. AURORAS OBSERVED AT BOSTON, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1818	.	.	.	.	.	.	.	.	1	.	.	.	1
1819	.	1	1	.	.	.	.	.	.	1	1	.	4
1820	.	.	.	1	.	.	.	.	.	.	.	.	1
1821	.	.	.	.	.	.	.	.	.	.	.	.	0
1822	.	.	.	.	.	.	.	.	.	1	.	.	1
1823	.	.	.	.	.	.	.	.	.	.	.	.	0
1824	.	.	.	.	.	.	.	.	.	.	.	.	0
1825	.	.	.	1	.	.	.	.	.	.	.	1	2
1826	.	.	.	.	.	.	.	.	.	.	.	.	0
1827	.	.	.	.	.	.	.	.	2	.	.	.	2
1828	.	.	.	.	.	.	.	.	.	.	.	.	0
1829	.	.	.	.	.	.	.	.	.	.	.	.	0
1830	.	.	.	.	.	2	.	.	.	.	.	1	3
1831–4	.	.	.	.	.	.	.	.	.	.	.	.	0
1835	.	.	.	.	.	.	.	.	.	.	2	.	2
1836	.	.	.	1	.	.	.	.	.	.	.	.	1
1837	.	.	.	.	.	.	1	.	.	.	.	2	3
1838	.	1	.	.	.	.	1	.	2	.	3	.	7
1839	2	.	.	.	.	.	.	.	1	.	.	.	3
1840	.	.	.	.	1	.	.	1	.	.	.	.	2
1841	.	2	.	.	.	.	.	.	.	.	.	.	2
1842–6	.	.	.	.	.	.	.	.	.	.	.	.	0
1847	.	.	.	1	.	.	.	.	.	.	.	.	1
1848	.	.	.	1	.	.	.	.	.	.	.	.	1
Total	2	4	1	5	1	2	2	1	6	2	6	4	36

IV. AURORAS OBSERVED AT SALEM, MASS., ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1786	.	2	6	5	2	3	7	4	3	4	3	2	41
1787	1	5	2	3	2	2	5	4	2	3	2	2	33
1788	2	1	.	.	.	.	4	5	7	4	.	.	23
1789	.	2	4	2	6	6	5	2	3	4	1	2	37
1790	.	2	.	.	2	2	2	1	.	1	1	.	11
1791	2	.	2	2	.	.	4	.	.	.	.	1	11
1792	.	.	.	.	.	.	3	.	.	2	.	1	6
1793	2	.	1	.	.	.	.	.	.	2	1	.	6
1794	.	.	.	1	.	.	.	.	.	.	.	.	1
1795	.	.	.	.	1	.	.	.	.	1	.	.	2
1796 } 1801 }	.	.	.	.	.	.	.	.	.	.	.	.	0
1802	.	.	.	.	.	1	.	.	.	.	.	.	1
1803	.	.	1	.	.	.	.	1	2	.	.	.	4
1804	.	.	.	1	2	.	.	.	.	.	1	.	4
1805	1	.	.	.	.	.	.	.	1	.	1	.	3
1806	.	.	.	1	.	.	.	.	.	1	.	.	2
1807–8	.	.	.	.	.	.	.	.	.	.	.	.	0
1809	1	.	.	.	.	1	.	.	.	.	.	.	2
1810–13	.	.	.	.	.	.	.	.	.	.	.	.	0
1814	.	1	.	1	.	.	.	.	1	.	.	.	3
1815	.	.	.	.	.	.	.	.	1	.	.	.	1
1816–17	.	.	.	.	.	.	.	.	.	.	.	.	0
1818	.	.	.	.	.	.	.	.	1	.	.	.	1
1819	.	1	2	.	.	.	.	.	.	.	2	.	5
1820	.	.	.	1	.	.	.	.	.	.	.	.	1
Total	9	14	18	17	15	15	30	17	21	22	12	8	198

V. AURORAS OBSERVED AT WORCESTER, MASS., ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1839	1	.	3	1	4	.	.	.	4	2	3	.	18
1840	4	.	1	2	1	1	2	4	.	1	4	4	24
1841	2	2	3	.	.	2	2	1	.	1	1	.	14
1842	2	3	.	4	.	2	.	.	.	.	1	.	12
1843	.	.	3	.	.	.	2	.	.	1	.	.	6
1844	.	.	.	1	.	.	.	1	.	.	.	.	2
1845	1	1	.	1	.	1	2	1	.	1	.	.	8
1846	1	1	.	1	.	1	.	.	1	1	.	1	7
1847	.	.	1	.	.	.	.	.	1	.	2	1	5
1848	.	2	.	3	1	.	2	.	.	1	3	1	13
1849	.	.	3	1	.	.	.	.	1	.	.	.	5
1850	.	.	.	1	2	.	1	.	.	2	.	.	6
1851	.	.	1	.	1	.	.	.	3	2	.	.	7
1852	2	.	.	.	.	.	.	.	.	.	.	2	4
1853	1	.	.	1	1	.	.	.	3	.	.	.	6
1854	2	2	3	1	.	.	.	.	4	.	.	.	12
1855–6	.	.	.	.	.	.	.	.	.	.	.	.	0
1857	.	.	.	.	.	.	.	.	1	.	.	.	1
1858	1	.	2	2	.	.	.	.	2	6	.	1	14
1859	.	.	2	2	.	.	.	3	2	2	.	.	11
1860	.	1	5	4	.	1	1	3	3	1	1	1	21
1861	2	1	.	.	.	1	.	.	2	1	.	.	7
1862	.	.	.	.	.	.	.	6	3	.	.	.	9
Total	19	13	27	25	10	9	12	19	30	22	15	11	212

VI. AURORAS OBSERVED AT PROVIDENCE, R. I., ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1832	.	.	.	.	.	.	.	.	.	.	1	.	1
1835	1	.	.	.	.	.	.	.	.	.	2	.	3
1836	.	.	.	1	1	.	2	2	.	.	.	.	6
1837	1	.	.	.	.	.	2	.	2	1	.	1	7
1838	.	1	.	1	1	1	.	1	2	1	1	.	9
1839	3	.	1	.	2	.	.	.	3	.	.	.	9
1840	1	1	1	1	1	.	1	.	.	.	2	.	8
1841	.	2	1	1	.	.	.	.	.	1	1	.	6
1842	1	.	.	.	.	.	.	.	.	.	.	.	1
1843	.	.	1	1	.	.	.	1	.	.	.	.	3
1844	.	.	.	.	.	1	.	.	.	1	.	.	2
1845	1	1	.	.	.	.	.	.	.	.	.	.	2
1846	1	1	.	1	1	.	.	1	2	.	.	.	7
1847	.	.	1	.	1	1	1	.	2	.	2?	.	8
1848	.	4	1	1	1	.	1	.	.	2	2	2	14
1849	1?	2	1	.	.	.	.	.	2	2	1	.	9
1850	1	.	2	2	2	.	1	.	2	2	.	.	12
1851	.	2	.	.	1	2	.	.	1	3	.	.	9
1852	2	1	.	1	4	1	2	.	1	1	2	.	15
1853	.	.	.	.	2	1	.	.	.	.	.	.	3
1854	1	.	3	.	1	.	.	.	1	1	.	.	7
1855	.	.	.	.	.	.	.	.	.	.	.	.	0
1856	.	.	.	.	.	.	.	.	.	1	.	.	1
1857	.	.	.	.	.	.	.	.	1	.	.	.	1
1858	1	.	1	1	.	.	.	.	1	1	.	.	5
1859	.	1	.	1	.	.	.	2	1	4	.	.	9
1860	.	1	1	1	.	.	.	.	.	.	.	.	3
Total	15	17	14	13	18	7	10	7	21	21	14	3	160

VII. AURORAS OBSERVED AT BURLINGTON, VT., ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1852	5	4	4	5	6	2	2	2	3	2	2	1	39*
1853	3	2	5	3	6	3	4	1	5	1	1	2	35
Total	8	6	9	8	12	5	6	3	8	3	3	3	74

VIII. AURORAS OBSERVED AT ST. MARTIN, CANADA, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1853	2	4	1	4	4	2	7	3	6	1	2	3	39
1854	4	5	6	5	5	2	7	3	8	2	.	3	50
Total	6	9	7	9	9	4	14	6	14	3	2	6	89

IX. AURORAS OBSERVED AT WILMINGTON, DEL., ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1827	.	.	.	.	.	.	.	1	3	.	2	.	6
1828	1	.	.	.	.	.	.	.	2	.	.	.	3
1829	1	.	1	.	.	.		.	.	.	.	1	3
1830	.	.	.	.	3	3	1	2	4	1	.	2	16
1831	2	1	1	1	1	1	4	.	.	1	.	.	12
1832	1	.	1	.	.	.	.	2	1	.	1	.	6
1833	1	.	1	.	1	1	1	.	.	1	.	1	7
Total	6	1	4	1	5	5	6	5	10	3	3	4	53

X. AURORAS OBSERVED AT NEWBERRY, VT., ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1830	.	.	.	.	.	.	.	.	.	.		1	1
1834	.	.	1	.	.	.	.	.	.	.	.	.	1
1835	.	.	.	.	.	.	.	.	.	.	1	.	1
1836	.	2	.	1	.	.	.	2	.	.	.	.	5
1837	2	.	.	2	.	.	.	1	.	.	.	.	5
1838	.	1	.	2	1	.	.	.	2	.	.	.	6
1839	1	.	1	2	.	.	.	1	3	.	1	.	9
1840	3	.	.	1	.	.	.	.	1	2	.	1	8
1841	.	3	6	.	.	.	.	.	.	.	.	.	9
1842	1	.	.	.	.	.	.	.	.	.	1	.	2
1843	.	.	2	.	.	.	1	.	1	.	.	.	4
1844	.	.	1	.	.	.	.	.	1	.	.	.	2
1845	1	2	.	.	.	.	.	.	.	1	.	.	4
1846	1	2	.	.	.	.	.	.	.	2	.	.	5
1847	.	.	2	.	.	1	.	.	.	.	.	.	3
1848	1	3	.	3	.	.	.	1	1	4	2	1	16
1849	1	4	.	.	1	.	.	.	2	4	1	.	13
1850	.	.	.	.	.	.	.	.	.	.	.	.	0
1851	2	4	2	.	.	.	.	.	3	2	.	.	13
1852	.	2	.	1	.	1	.	.	3	2	1	.	10
1853	2	2	2	1	3	.	.	1	2	1	1	1	16
1854	4	3	2	3	.	.	.	.	2	1	.	.	15
1855	1	.	1	1	1	.	.	.	.	.	.	.	4
1856	1	.	1	.	.	.	.	.	.	2	1	.	5
1857	.	.	.	1	.	.	.	.	1	.	1	3	6
1858	1	1	1	4	.	.	.	.	3	4	.	.	14
1859	1	2	1	4	.	.	.	1	2	1	.	1	13
1860	.	2	3	2	.	.	2	1	2	.	.	.	12
1861	.	1	2	1	.	.	.	.	1	4	.	.	9
1862	.	.	.	1	.	.	.	3	2	.	.	1	7
Total	23	34	28	30	6	2	3	11	32	30	10	9	218

XI. AURORAS OBSERVED AT JENA, GERMANY, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1770	1	.	1	.	.	.	.	3	.	.	.	2	7
1771	.	.	.	.	1	.	.	.	.	.	.	.	1
1772	.	.	.	.	.	.	.	.	.	1	.	.	1
1777	.	1	.	.	.	.	.	.	.	.	2	1	4
1778	.	1	.	1	.	.	.	.	2	.	.	1	5
1779	.	4	1	.	.	.	.	.	2	4	.	1	12
1780	.	1	.	1	.	.	1	.	.	1	1	.	5
1781	.	.	.	.	.	1	.	.	2	.	.	1	4
1783	.	.	1	2	1	.	.	.	.	.	1	.	5
1784	.	.	.	.	1	.	.	.	1	.	1	.	3
1785	.	.	.	.	.	.	.	.	.	1	.	.	1
1786	.	.	.	1	.	.	.	.	.	1	.	.	2
1787	.	.	.	2	1	.	.	1	1	5	.	.	10
1788	.	2	.	1	.	1	2	4	5	1	.	.	16
1789	.	.	1	.	.	.	.	.	.	1	.	.	2
1790	1	.	.	.	.	.	1	.	.	.	.	.	2
1792	.	.	.	1	.	.	.	.	1	.	.	.	2
1793	.	.	.	.	.	.	.	.	.	.	1	.	1
1796	.	.	.	1	.	.	.	.	.	.	.	.	1
Total	2	9	4	10	4	2	4	8	14	15	6	6	84

XII. AURORAS OBSERVED AT NEW HAVEN, CONN., ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1763–75	9	2	5	1	1	2	6	2	1	5	1	2	37
1777–8	2	1	1	.	.	.	1	.	4	.	1	1	11
1780	.	.	2	.	.	2	5	1	1	1	10	3	[illegible]
1781	3	1	3	4	2	3	1	3	2	1	1	1	25
1782	.	.	1	2	3	2	1	5	3	2	1	.	20
1783	1	2	3	4	1	1	1	1	.	.	.	.	14
1784–85	.	.	.	.	1	1	1	1	1	.	2	.	7
1786	.	1	7	2	3	2	2	3	.	2	2	.	24
1787	.	.	3	.	1	4	4	.	1	1	.	1	15
1788	.	2	.	1	3	.	1	8	4	.	.	.	19
1789	.	1	2	1	5	4	5	.	.	1	1	1	21
1790–1	1	.	.	.	.	.	3	.	2	1	1	2	10
1802–20	2	1	2	3	3	1	1	.	6	1	1	.	21
1827–30	3	1	.	1	.	.	.	3	4	.	2	5	19
1831–36	1	1	.	2	2	1	2	3	1	.	7	7	27
1837	2	1	1	2	1	3	5	5	5	4	7	4	40
1838	5	5	2	3	1	2	4	3	8	1	4	1	39
1839	5	2	3	2	6	2	2	4	7	1	6	2	45
1840	5	2	1	5	3	.	3	4	3	4	5	6	44
1841	3	6	5	4	1	2	2	4	6	1	3	2	42
1842	1	2	.	4	.	.	1	.	2	.	1	.	11
1843		.	2	1	1	1	1	.	2	1		1	10
1844	2	.	.	1	1	.	.	1	.	1	2	2	10
1845	2	1	.	3	1	.	3	3	3	2	1	3	30
1846	2	1	1	4	4	1		4	3	7	1	2	22
1847	1	1	2	1	1	1	2	1	3	.	6	3	53
1848	3	9	2	5	3	1	4	3	1	4	13	5	20
1849	2	4	2	1	.	1	2	.	4	2	1	1	30
1850	1	4	4	2	2	.	3	2	5	4	1	2	21
1851	2	1	3	.	1	2	2	.	5	5		.	42
1852	1	5	2	3	6	5	3	1	6	3	4	3	22
1853	1	1	5	3	3	2	1	1	2	1	1	1	22
1854	3	1	5	2	2	.	.	.	2	.	.	.	15
Total	63	59	72	67	62	46	72	66	97	62	86	61	813

XIII. AURORAS OBSERVED AT ABO, FINLAND, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1749	.	1	.	1	.	.	.	.	1	.	.	1	4
1750	.	2	2	.	.	.	.	.	3	.	.	.	7
1751	.	.	.	.	.	.	.	1	.	.	1	.	2
1752	1	2	1	1	.	.	.	1	3	5	1	.	15
1753	.	1	1	3	1	.	.	.	3	1	.	.	10
1754	.	1	1	.	.	.	.	.	2	5	1	.	10
1755	1	.	.	.	.	.	.	.	.	1	.	1	3
1756	.	.	.	.	.	.	.	.	1	.	.	.	1
1757	.	.	.	1	.	.	.	.	1	2	1	.	5
1758	.	1	1	.	.	.	.	.	.	2	1	2	7
1759	3	1	1	2	.	.	.	.	2	1	.	1	11
1760	.	3	.	3	.	.	.	1	1	.	1	.	9
1761	1	2	2	1	.	.	1	.	3	2	2	1	15
1762	3	.	5	2	.	.	.	3	4	2	.	1	20
Total	9	14	14	14	1	0	1	6	24	21	8	7	119

XIV. AURORAS OBSERVED IN THE STATE OF NEW YORK, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1826	.	.	.	.	.	.	.	.	.	2	.	.	2
1827	1	.	.	2	.	.	.	5	3	1	1	1	14
1828	3	2	.	2	.	.	1	2	6	3	1	1	21
1829	3	.	.	3	2	5	.	2	3	3	1	2	24
1830	2	4	4	5	10	7	5	12	8	14	4	5	80
1831	3	4	15	6	2	8	11	1	1	3	.	1	55
1832	1	.	2	5	3	3	.	4	3	2	1	.	24
1833	1	.	2	3	4	2	3	3	10	6	1	2	37
1834	3	2	6	2	1	.	2	2	1	8	2	6	35
1835	5	3	2	1	.	2	2	2	7	1	4	1	30
1836	.	2	1	9	4	10	10	11	3	4	6	1	61
1837	4	2	6	6	3	3	5	5	8	2	5	1	50
1838	5	4	.	4	1	3	4	3	10	1	4	3	42
1839	9	3	5	7	8	2	2	6	6	5	3	1	57
1840	6	5	7	10	9	3	3	9	5	6	5	5	73
1841	2	12	9	6	5	2	8	12	5	5	6	1	73
1842	3	3	2	6	.	3	6	1	3	2	4	2	35
1843	4	8	5	8	3	7	7	3	6	5	.	.	56
1844	1	1	5	3	5	1	1	1	4	3	4	1	30
1845	3	3	.	3	1	.	3	5	2	2	1	1	24
1846	2	.	1	5	9	2	3	6	8	5	2	4	47
1847	2	1	9	7	3	1	3	3	3	2	8	4	46
1848	8	12	8	9	3	3	6	5	1	7	6	5	73
1849	4	8	8	8	.	5	6	5	12	10	1	6	73
1850	1	7	9	5	7	7	9	14	13	8	4	6	90
1851	.	3	4	7	6	1	6	3	10	7	1	5	53
Total	76	89	110	132	89	80	106	125	141	117	75	65	1205

XV. AURORAS OBSERVED AT GOTHAAB, GREENLAND, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1841	.	.	.	.	.	.	.	.	5	14	19	22	60
1842	15	18	7	9	.	.	.	1	14	6	11	12	93
1843	12	10	16	4	.	.	.	1	11	3	18	9	84
1844	11	8	9	5	.	.	.	3	12	12	15	12	87
1845	12	13	9	2	.	.	.	.	11	10	8	9	74
1846	11	11	9	1	.	.	.	.	.	.	.	.	32
Total	61	60	50	21	0	0	0	5	53	45	71	64	430

XVI. AURORAS OBSERVED AT HAMMERFEST, NORWAY, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1850	.	1	.	.	.	.	.	.	.	.	.	.	1
1851	2	.	.	.	.	.	.	.	1	2	2	2	9
1852	3	2	.	.	.	.	.	.	.	.	2	2	9
1853	2	2	1	.	.	.	.	.	.	.	1	1	7
1854	2	2	.	.	.	.	.	.	1	1	3	3	12
1855	1	.	.	.	.	.	.	.	.	3	4	.	8
1856	1	2	1	.	.	.	.	.	2	1	.	2	9
1857	2	.	.	.	.	.	.	.	.	.	.	1	3
1858	2	3	2	.	.	.	.	.	.	.	.	1	8
1859	1	.	3	.	.	.	.	.	.	1	2	5	12
1860	2	1	.	.	.	.	.	.	.	1	2	2	8
1861	1	3	1	.	.	.	.	.	.	.	.	.	5
Total	19	16	8	0	0	0	0	0	4	9	16	19	91

XVII. AURORAS OBSERVED AT KENDALL AND KESWICK, ENGL., ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1786	.	.	.	.	3	.	1	2	6	2	1	1	16
1787	3	1	2	3	4	1	.	2	1	5	5	.	27
1788	6	5	3	8	7	1	1	6	3	6	5	2	53
1789	1	4	4	3	.	1	.	9	5	7	10	1	45
1790	1	2	6	8	4	.	.	.	1	3	9	2	36
1791	1	1	5	4	2	1	.	.	6	7	7	3	37
1792	3	2	2	3	1	1	.	2	1	6	1	1	23
1793	3	3	4	3	.	.	.	.	.	.	.	.	13
Total	18	18	26	32	21	5	2	21	23	36	38	10	250

XVIII. AURORAS OBSERVED IN GREAT BRITAIN, &c., ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1794	2	.	2	.	.	.	.	.	.	.	.	2	6
1795	.	.	.	.	.	.	.	.	2	1	.	.	3
1796	.	.	.	.	.	.	.	.	.	.	.	.	0
1797	1	4	3	1	.	.	.	.	.	.	4	.	13
1798	.	.	.	.	.	.	.	.	.	.	.	.	0
1799	.	.	.	.	.	.	.	.	1	1	.	.	2
1800	.	.	.	.	.	.	.	.	.	.	2	1	3
1801	2	1	.	.	.	.	.	.	.	1	.	.	4
1802	.	1	1	.	.	.	.	.	1	.	.	1	4
1803	.	.	.	2	.	.	.	.	2	1	.	1	6
1804	.	1	.	2	1	.	.	.	.	.	2	.	6
1805	1	1	.	1	.	.	.	.	1	.	.	.	4
1806	.	1	.	.	.	.	.	.	1	1	.	.	3
1807	.	.	.	.	.	.	.	.	.	.	.	.	0
1808	.	.	1	.	.	.	.	.	.	.	.	.	1
1809–13	.	.	.	.	.	.	.	.	.	.	.	.	0
1814	.	.	1	.	.	.	.	.	2	.	.	.	3
1815	.	.	.	.	.	.	.	.	.	.	.	.	0
1816	.	.	.	.	.	.	.	.	1	.	.	.	1
1817	.	1	.	.	.	.	.	.	.	.	.	.	1
1818	.	.	.	.	.	.	.	.	.	2	.	.	2
1819	.	.	.	.	.	.	.	.	.	2	.	1	3
1820	1	1	.	.	.	.	.	.	.	.	.	.	2
1821	.	.	.	.	.	.	.	.	.	.	1	1	2
1822–4	.	.	.	.	.	.	.	.	.	.	.	.	0
1825	.	.	1	.	.	.	.	.	.	.	.	.	1
1826	1	.	1	.	.	.	.	.	.	.	.	.	2
1827	2	1	.	.	.	.	.	1	2	1	2	1	10
1828	.	.	.	.	.	1	.	.	3	3	.	4	11
1829	.	.	3	.	1	1	1	.	2	4	3	3	18
1830	2	.	2	2	.	.	.	1	10	4	5	6	32
1831	7	3	6	4	1	.	.	.	1	1	.	.	23
1832	1	.	.	.	.	.	.	.	1	.	2	1	5
1833	.	3	2	.	.	.	.	1	5	1	.	.	12
1834	1	1	.	.	.	.	.	.	.	.	.	.	2
Total	21	19	23	12	3	2	1	3	35	23	21	22	185

XIX. AURORAS OBSERVED AT PLYMOUTH, ENGLAND, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1728	.	.	1	2	.	.	3	2	.	3	1	1	13
1729	2	.	.	1	2	.	.	.	1	1	1	.	8
1730	.	.	2	1	.	.	.	.	1	3	.	.	7
1731	.	.	1	.	1	.	.	1	1	1	.	1	6
1732	1	1	.	.	.	.	.	.	.	.	.	.	2
1733	.	1	.	1	.	.	2	.	1	1	1	2	9
1734	.	.	.	.	2	.	.	.	1	.	.	.	3
1735	.	.	.	.	.	.	.	1	.	1	.	.	2
1736	.	2	1	.	.	.	.	.	2	2	4	.	11
1737	.	.	2	.	.	.	.	4	.	.	2	1	9
1738	1	.	.	1	.	.	.	.	.	.	4	.	6
1739	.	.	3	1	1	.	.	.	2	.	.	.	7
1740	.	.	3	.	.	1	.	.	.	.	.	.	4
1741	.	.	2	1	.	.	2	.	.	2	.	.	7
1742	.	.	5	1	.	.	.	.	.	.	.	.	6
1743	1	.	1	1	.	.	1	.	.	.	.	.	4
1744	.	.	.	1	.	.	.	.	.	.	.	1	2
1745	1	1	.	.	.	.	.	.	.	.	.	.	2
1746	.	1	2	.	.	.	.	.	.	1	.	.	4
1747	2	.	.	1	.	.	.	.	.	.	.	2	5
1748	.	1	.	.	.	.	.	.	1	.	.	1	3
Total	8	7	23	12	6	1	8	8	10	15	13	9	120

XX. AURORAS OBSERVED AT MAKERSTOUN, SCOTLAND, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1843	1	1	4	2	.	.	.	.	3	3	3	3	20
1844	2	3	5	3	3	.	.	2	.	4	6	2	30
1845	11	6	11	4	1	.	.	2	3	4	3	2	47
1846	.	2	1	2	.	.	.	2	4	4	1	1	17
1847	1	1	1	1	.	.	.	1	2	5	5	1	18
1848	.	3	4	2	2	.	.	.	1	7	5	2	26
1849	7	10	2	2	.	.	.	.	3	2	.	.	26
Total	22	26	28	16	6	0	0	7	16	29	23	11	184

XXI. AURORAS OBSERVED AT DUNSE, N. BRITAIN, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1838	5	3	4	3	.	.	.	2	4	1	2	3	27
1839	9	1	2	4	1	.	.	.	11	7	2	1	38
1840	5	5	2	4	.	.	.	3	7	6	6	5	43
1841	6	3	4	4	2	.	.	3	3	3	7	7	42
1842	2	2	.	.	.	.	1	.	3	.	1	.	9
1843	2	1	1	1	.	.	.	2	.	3	.	.	10
1844	1	.	2	.	.	.	.	.	1	3	4	2	13
1845	1	2	.	1	.	.	.	1	2	1	1	1	10
1846	.	1	.	.	.	.	1	2	7	4	1	.	16
1847	2	2	3	1	.	.	.	1	5	6	6	4	30
Total	33	20	18	18	3	0	2	14	43	34	30	23	238

XXII. AURORAS OBSERVED AT CHRISTIANIA, NORWAY, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1837	.	.	.	.	.	.	.	4	9	4	3	2	22
1838	.	5	3	4	.	.	.	1	5	3	5	2	28
1839	6	4	3	5	1	.	.	.	1	4	4	2	30
1840	6	6	11	3	.	.	.	2	2	2	1	7	40
1841	6	.	2	3	.	.	.	2	3	4	11	4	35
1842	2	5	5	13	.	.	.	4	4	7	4	5	49
1843	6	8	11	1	.	.	.	.	7	4	.	1	38
1844	3	1	6	1	.	.	.	2	3	3	3	.	22
1845	.	2	3	1	.	.	.	6	1	2	3	.	18
1846	.	.	3	3	1	.	.	8	12	4	3	5	39
1847	2	1	5	6	.	.	.	1	4	10	4	5	38
1848	4	4	1	6	.	.	.	5	4	5	4	5	38
1849	5	7	6	5	.	.	1	.	3	6	4	5	42
1850	3	3	6	1	1	.	.	.	6	3	.	2	25
1851	1	4	1	.	.	.	.	.	3	2	2	4	17
1852	1	8	7	6	.	.	.	.	11	2	4	6	45
1853	1	3	2	2	.	.	.	.	.	.	.	.	8
Total	46	61	75	60	3	0	1	35	78	65	55	55	534

XXIII. AURORAS OBSERVED AT JAKOBSHAVN, GREENLAND, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1840	.	1	1	.	.	.	.	.	1	2	2	3	10
1841	.	4	1	.	.	.	.	.	.	3	4	3	15
1842	3	.	.	.	.	.	.	.	3	2	5	2	15
1843	2	2	3	.	.	.	.	.	2	3	2	4	18
1844	2	1	1	.	.	.	.	.	.	.	5	3	12
1845	4	3	3	1	.	.	.	.	4	3	2	4	24
1846	2	3	1	.	.	.	.	.	2	6	2	5	21
1847	4	3	3	.	.	.	.	.	1	3	1	2	17
1848	2	4	.	.	.	.	.	.	.	1	4	3	14
1849	1	.	.	.	.	.	.	.	2	2	3	3	11
1850	3	1	3	.	.	.	.	.	2	3	4	5	21
1851	4	2	1	.	.	.	.	.	.	.	.	.	7
Total	27	24	17	1	0	0	0	0	17	28	34	37	185

XXIV. AURORAS OBSERVED AT STOCKHOLM, SWEDEN, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1783	.	.	1	1	1	.	.	1	2	.	.	.	6
1784	1	1	.	.	.	.	.	2	2	1	.	.	7
1785	1	1	1	3	.	.	.	.	5	4	2	2	19
1786	.	3	9	14	1	.	.	2	6	5	3	4	47
1787	10	5	8	8	2	.	.	1	4	5	6	6	55
1788	4	3	7	6	1	.	.	3	9	11	5	4	53
1789	3	5	6	10	.	.	.	9	6	4	10	4	57
1790	5	9	13	9	6	.	.	.	3	5	5	4	59
1791	3	.	2	2	.	.	.	1	7	2	1	1	19
1792	.	7	3	3	2	.	.	.	.	2	2	.	19
Total	27	34	50	56	13	0	0	19	44	39	34	25	341

XXV. AURORAS OBSERVED AT ST. PETERSBURG, RUSSIA, ARRANGED BY YEARS AND MONTHS.

Year	Jan	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1726	.	.	1	.	.	.	.	.	.	1	.	.	2
1727	.	4	2	.	.	.	.	.	2	2	.	1	11
1728	1	2	7	2	1	.	.	1	2	6	2	1	25
1729	.	.	.	.	1	.	.	1	3	.	1	.	6
1730	1	1	7	6	1	.	.	3	4	7	4	1	35
1731	2	.	5	1	:	.	.	1	1	5	1	2	18
1732	3	2	1	.	.	.	.	1	2	.	3	.	12
1733	.	.	2	.	.	.	.	.	.	1	2	1	6
1734	.	1	4	.	.	.	.	.	2	6	.	.	13
1735	.	1	1	.	.	.	.	.	1	1	1	2	7
1736	1	2		1	.	.	.	1	2	.	1	1	9
1737	.	.	1	3	.	.	.	3	2	1	.	.	10
1738	.	1	.	.	.	.	.	1	2	1	.	2	7
1739	1	2	7	1	1	.	.	2	5	.	.	.	19
1740	3	.	4	.	.	.	.	.	3	1	2	.	13
1741	3	3	2	4	.	.	.	.	5	4	2	3	26
1742	1	.	7	8	.	.	.	2	3	4	2	2	29
1743	2	.	2	3	.	.	.	.	1	.	1	.	9
1744	.	.	.	.	.	.	.	.	.	.	.	1	1
1745	.	.	.	.	.	1	.	.	.	.	.	.	1
1746	1	1	.	.	.	.	.	.	.	.	5	3	10
1747	1	2	.	2	.	.	.	.	.	.	1	.	6
1748	.	.	.	1	.	1	.	.	.	.	.	.	2
1749	.	.	.	.	.	.	.	.	.	1	.	.	1
1750	.	1	.	.	1	.	.	.	1	.	1	.	4
1751	1	.	.	.	.	1	.	.	2	.	.	1	5
1752	.	.	3	.	1	.	1	4	1	.	1	1	12
1753–4	.	.	.	.	.	.	.	.	.	.	.	.	0
1755	.	1	.	.	.	.	.	.	.	.	.	.	1
1756	.	.	.	.	.	.	.	.	1	.	.	.	1
1757	1	.	.	.	.	.	.	.	.	.	.	.	1
1758	.	.	1	.	.	.	.	.	.	.	.	.	1
1759	.	.	1	2	.	.	.	.	.	.	.	3	6
1760	1	.	.	6	.	.	.	2	.	.	1	.	10
1761	.	3	.	.	.	.	.	1	4	2	.	1	11
1762	2	.	3	4	1	.	.	3	3	2	3	4	25
1763	.	.	3	1	.	.	.	1	.	1	1	.	7
1764	1	4	2	1	.	.	.	1	1	.	1	1	12
1765	1	1	4	1	.	.	.	.	1	.	.	.	8
1766	.	.	.	.	.	.	.	.	.	.	.	.	0
1767	.	2	.	2	.	.	.	.	.	.	.	.	4
1768	2	1	.	.	.	.	.	.	.	.	.	.	3
1769	.	.	.	.	.	.	.	.	1	4	3	2	10
1770	.	4	3	3	.	.	.	.	.	1	2	.	13
1771	1	3	7	1	2	.	1	1	4	4	2	1	27
1772	3	2	7	4	.	.	.	.	.	2	2	2	22

ST. PETERSBURG, *Continued.*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1773	5	4	4	3	3	.	.	1	1	3	6	2	32
1774	2	1	4	11	4	.	.	2	6	9	4	3	46
1775	3	7	4	5	1	.	.	.	2	1	.		23
1776	1	.	1	1	.	.	.	.	6	3	.	.	12
1777	1	4	6	8	.	.	.	.	2	4	.	1	26
1778	4	2	5	4	2	.	.	.	6	3	.	5	31
1779	1	6	5	6	2	.	.	1	3	7	3	3	37
1780	.	2	2	1	.	.	.	.	7	2	2	3	19
1781	2	2	3	8	3	.	.	1	1	6	1	2	29
1782	2	1	3	4	3	.	.	1	7	7	.	2	30
1783	.	.	3	5	7	.	.	.	.	1	1	.	17
1784	.	.	1	1	.	.	.	3	.	.	.	2	7
1785	1	.	2	2	.	.	.	1	4	3	1	.	14
1786	.	3	12	8	1	.	.	3	3	5	3	2	40
1787	.	2	3	3	.	.	.	.		2	.	.	10
1788	.	1	1	.	.	.	.	.	.	2	.	.	10
1789	.	.	2	1	.	.	.	3	1	5	3	.	15
1790	.	.	.	.	1	.	.	.	2	1	.	.	4
1791	.	.	.	.	.	.	.	.		.	.	.	0
1792	.	.	.	.	.	.	.	1	?	1	.	.	2
1793	.	.	.	.	.	.	.	1		1	.	.	2
1794	.	.	.	2	.	.	.	.	?	.	.	.	2
1795	.	.	1	.	.	.	.	.	.	1	.	.	2
1796	.	1	.	.	.	.	.	.	.	.	.	.	1
1797	.	1	.	.	.	.	.	.	.	.	.	.	1
1798	.	.	.	.	.	.	.	.	.	.	.	.	0
1799	1	.	.	.	.	.	.	.	.	.	.	.	1
1802	.	.	1	.	.	.	.	.	.	.	.	.	1
1804	.	.	.	.	.	.	.	.	1	1	.	1	3
1805	.	.	.	.	.	.	.	.	1	.	.	.	1
1806	.	.	.	.	.	.	.	1	.	.	.	.	1
1808	.	.	.	.	.	.	1	.	.	.	.	.	1
1809–23	.	.	.	.	.	.	.	.	.	.	.	.	0
1824	.	.	.	.	.	.	.	1	1	.	.	.	2
1825	.	.	.	.	.	.		.	1	.	.	.	1
1826	.	.	.	.	.	.	.	.	.	.	.	.	0
1827	.	1	.	.	.	.	.	.	1	.	.	.	2
1828	.	.	.	.	.	.	.	.	.	.	.	1	1
1830	.	1	1	.	1?	.	.	.	5?	2?	.	2	12
1831	.	.	3	1	.	.	.	.	1	.	.		5
1832	.	.	.	.	.	.	.	.	.	.	1	.	1
1833	.	.	1	.	.	.	.	1	1	1	.	.	4
1834	.	.	.	.	.	.	.	.	1	.	1	.	2
1836	.	.	.	.	.	.	.	.	.	1	.	.	1
1837	.	.	.	.	.	.	.	.	.	2	.	.	2
1838	2	.	.	.	.	.	.	.	.	.	.	.	2
1841	.	.	1	1	.	.	.	1	1	.	.	.	4
1842	.	1	3	6	3	5	5	3	3	6	3	2	40
1843	.	.	.	1	.	.	1	.	2	3	.	3	10
1844	1	1	4	1	.	.	.	.	.	1	.	1	9
1845–6	.	.	.	.	.	.	.	.	.	.	.	.	0

ST. PETERSBURG, *Continued.*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov	Dec.	Total
1847	.	.	.	.	.	.	.	.	1	.	.	3	4
1848	1	.	.	.	.	.	.	.	.	.	1	.	2
1849	.	1	.	.	.	.	.	.	.	.	;	.	1
1850	.	2	.	.	.	.	.	.	.	.	1	1	4
1851	1	.	.	.	.	.	.	.	3	1	.	1	6
1852	1	4	1	.	.	1	.	.	.	.	3	.	10
1853–4	.	.	.	.	.	.	.	.	.	.	.	.	0
1855	1	2	.	.	.	2	1	.	1	.	.	.	7
1856	.	.	1	.	.	.	.	1	1	.	.	.	3
1857	.	.	.	.	1	.	.	.	.	.	.	2	3
1858	3	1	5	3	.	.	.	.	.	.	.	.	12
1859	.	1	.	3	.	.	.	2	4	4	.	1	15
1860	.	2	7	5	1	2	5	5	.	.	.	1	28
1861	4	2	2	1	.	.	.	.	.	.	.	3	12
Total	70	100	179	152	42	13	15	62	145	146	83	79	1086

XXVI. AURORAS OBSERVED AT BRUSSELS, BELGIUM, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1778	4	1	4	.	4	3	1	1	3	2	.	2	22
1779	1	1	1	2	2	.	2	.	.	3	2	3	17
1782	.	.	.	.	.	.	.	.	2	2	.	.	4
1783	.	.	.	4	2	.	.	.	.	.	.	.	6
1784	.	.	.	.	.	.	.	.	.	.	.	.	0
1785	.	.	.	1	2	.	2	2	1	.	2	.	10
1786	1	1	1	5	12	1	3	6	.	2	.	2	34
1787	1	5	5	3	2	7	5	2	.	2	1	.	33
1788	.	1	1	2	5	5	1	.	2	.	.	1	18
1789	.	.	5	2	4	1	6	.	3	2	1	.	24
1790	.	.	.	.	.	.	.	.	.	.	.	.	0
1791	1	.	.	.	2	1	1	.	1	2	1	4	13
1792	1	.	.	.	3	.	1	.	.	1	.	.	6
1833	.	.	.	.	.	.	.	.	1	.	1	.	2
1834	1	.	.	.	.	1	.	.	.	.	.	.	2
1835	.	.	.	.	.	.	.	.	.	.	1	.	1
1836	.	.	.	.	.	.	.	.	.	1	.	.	1
1837	.	1	.	.	.	.	.	.	1	.	1	.	3
1838	.	.	.	1	.	.	.	.	.	.	.	.	1
1839	1	.	.	.	1	.	.	.	1	1	.	.	4
1840	.	.	.	.	.	.	.	.	1	1	.	2	4
1841	1	1	.	.	.	2	.	.	.	.	1	.	5
1842	.	.	.	.	.	1	1	.	.	1	.	.	3
1843	.	.	.	2	2	.	.	.	.	.	.	.	4
1846	.	.	.	.	.	.	.	.	.	.	2	.	2
1847	.	.	1	.	.	1	.	.	.	1	1	1	5
1848	.	.	.	.	.	.	.	.	.	.	2	.	2
1849	.	2	.	.	.	.	.	.	.	1	1	.	4
1851	.	.	.	.	.	.	.	.	.	1	.	.	1
Total	12	13	18	22	38	23	23	11	16	23	17	15	231

XXVII. AURORAS OBSERVED AT UPSAL, SWEDEN, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1716	.	.	1	.	.	.	.	.	.	.	.	.	1
1718	.	1	2	.	.	.	.	1	1	2	.	2	9
1720	1	.	.	.	.	.	.	.	.	.	.	.	1
1723	.	.	.	.	.	.	.	.	.	1	.	.	1
1724	.	1	.	1	.	.	.	.	.	.	2	.	4
1725	1	1	.	.	.	.	.	.	.	1	1	1	5
1726	1	.	1	.	.	.	.	.	.	1	1	3	7
1727	2	2	2	.	.	.	.	.	.	.	.	2	8
1728	2	7	3	2	.	.	.	3	3	4	2	1	27
1729	1	5	5	4	1	.	.	.	3	3	6	3	31
1730	4	5	3	.	1	.	1	3	15	10	10	.	52
1731	2	3	5	.	.	.	.	5	4	6	5	6	36
1732	10	6	11	6	.	.	.	1	.	3	1	4	42
1736	.	.	.	.	.	.	.	.	5	7	.	2	14
1737	4	1	.	.	.	.	.	.	.	.	.	.	5
1739	1	2	6	6	2	.	.	5	8	7	7	1	45
1740	3	5	8	.	1	.	1	3	4	6	3	3	37
1741	6	7	9	7	.	.	1	11	9	16	7	10	83
1742	1	7	7	2	.	.	.	7	8	10	2	2	46
1743	2	5	7	6	1	.	.	5	6	8	4	3	47
1744	1	2	3	1	.	2	.	.	2	1	1	2	15
1745	3	7	.	.	.	.	.	.	2	1	2	5	20
1746	5	10	5	1	.	.	.	1	6	14	3	4	49
1747	6	1	8	3	.	.	.	†4	4	4	4	2	36
1748	2	4	8	.	.	.	.	4	7	3	6	6	40
1749	.	4	10	4	.	.	.	1	3	5	2	3	32
1750	2	5	6	2	.	.	.	5	2	2	2	1	27
1751	.	.	1	1	.	.	.	.	3	5	4	8	22
1752	8	5	11	.	.	.	.	.	2	6	4	4	40
1753	.	3	10	8	.	.	.	2	5	.	1	5	34
1754	1	2	5	2	.	.	.	.	1	2	3	1	17
1755	.	2	.	.	.	.	.	.	1	3	2	1	9
1756	1	2	1	2	.	.	.	.	6	3	.	.	15
1759	.	6	4	2	.	.	.	5	11	2	9	12	51
1760	6	9	5	7	.	.	1	3	.	8	7	4	50
1761	9	11	4	8	1	.	.	3	5	2	4	1	48
1762	.	.	1	.	.	.	.	.	.	.	4	7	12
Total	85	131	152	75	7	2	4	72	126	146	109	109	1018

XXVIII. AURORAS OBSERVED AT TORONTO, CANADA, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov	Dec.	Total
1848	8	14	13	18	11	6	9	6	7	15	13	12	132
1849	8	17	11	20	11	11	12	8	12	12	13	4	139
1850	3	3	3	6	5	3	5	4	5	9	3	1	50
1851	2	3	7	2	8	4	5	7	9	7	5	9	68
Total	21	37	34	46	35	24	31	25	33	43	34	26	389

XXIX. AURORAS OBSERVED AT BERLIN, PRUSSIA, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1707	.	.	1	.	.	.	.	.	.	2	1	.	4
1716	.	.	1	2	.	.	.	.	.	.	.	.	3
1717	.	1	.	1	.	.	.	1	1	.	.	.	4
1718	.	.	2	.	1	.	.	.	.	.	.	.	3
1719	.	1	.	.	.	.	.	.	.	1	1	.	3
1720	1	1	.	.	.	.	.	.	.	.	2	.	4
1721	1	1	1	.	.	.	.	.	.	.	.	.	3
1722	.	.	.	.	.	.	.	.	2	2	.	.	4
1723	.	.	1	1	.	.	.	.	.	.	.	.	2
1725	.	1	1	1	.	.	.	.	.	2	.	.	5
1726	.	.	.	.	.	.	.	.	.	1	.	.	1
1727	.	.	2	1	.	.	.	.	.	1	.	.	4
1728	.	1	.	1	1	1	1	1	1	1	2	.	10
1729	.	.	.	.	.	.	1	.	1	2	1	1	6
1730	.	1	1	1	1	.	.	.	1	3	3	.	11
1731	1	.	.	.	.	.	.	.	1	5	.	.	7
1732	.	2	2	1	.	.	.	1	2	3	1	.	12
1733	.	.	2	1	.	.	1	1	.	2	1	2	10
1734	1	1	1	1	.	.	.	.	1	.	.	.	5
1735	2	.	2	1	.	.	.	.	.	.	.	.	5
1768	.	.	.	.	.	.	.	.	.	.	.	1	1
1769	.	.	.	.	.	.	.	.	.	1	1	.	2
1770	2	5	5	5	1	.	.	.	1	.	.	.	19
1771	4	4	1	3	5	1	1	.	.	3	2	.	24
1772	2	1	4	3	.	.	.	1	1	.	2	1	15
1773	4	4	4	.	4	.	.	.	1	.	3	.	20
1774	.	.	6	4	.	.	.	.	.	2	.	.	12
1775	.	.	.	.	.	.	.	.	.	.	.	1	1
1776	2	.	.	.	.	.	.	.	1	1	.	.	4
1777	.	1	3	3	.	.	.	1	1	.	1	2	12
1778	.	.	3	3	.	.	.	1	2	1	.	.	10
1779	.	4	.	1	8	.	.	.	1	.	2	.	16
1780	.	.	.	1	.	.	.	.	.	.	.	1	2
1781	.	1	3	.	5	.	.	.	3	1	.	2	15
1782	1	1	3	.	1	.	1	.	1	4	.	.	12
1783	.	.	2	5	2	.	.	.	.	2	.	1	12
1784	.	.	.	2	.	.	1	2	.	.	1	.	6
1785	.	.	.	.	.	.	.	.	.	.	2	1	3
1786	.	3	2	6	10	.	2	.	.	1	.	.	24
1787	.	1	.	.	.	.	2	1	.	4	3	.	11
1788	.	2	.	.	.	.	.	.	.	.	.	.	2
1789	.	.	2	.	.	.	.	.	.	.	.	.	2
Total	21	37	55	48	39	2	10	10	22	45	29	13	331

XXX. AURORAS OBSERVED AT PARIS, FRANCE, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar	Apr	May	June	July	Aug.	Sept.	Oct.	Nov	Dec.	Total
1784	.	.	.	.	3	1	.	.	.	.	1	.	5
1785	.	.	1	.	1	.	.	.	.	.	.	.	2
1786	.	.	1	.	3	.	1	.	1	.	1	.	7
1787	1	1	3	.	5	1	1	3	2	3	2	1	23
1788	.	.	1	3	3	.	2	1	1	2	.	1	14
1789	.	.	2	.	1	2	1	3	1	1	.	1	12
1790	1	2	1	.	1	1	1	.	1	.	.	.	8
1791	1	.	.	.	.	.	.	1	.	.	.	1	3
1792	.	.	.	.	.	.	.	.	.	.	.	.	0
1793	.	.	1	.	.	.	.	.	.	.	.	.	1
1794	.	.	.	1	.	.	.	.	.	.	2	.	3
1795	.	.	.	.	.	.	.	.	2	.	.	.	2
1796	.	.	.	.	1	.	.	.	.	.	.	.	1
1797-9	.	.	.	.	.	.	.	.	.	.	.	.	0
1800	.	.	.	.	.	.	.	2	.	.	.	.	2
1801-2	.	.	.	.	.	.	.	.	.	.	.	.	0
1803	.	.	1	.	.	.	.	.	.	.	.	.	1
1804	.	.	1	.	.	.	.	.	.	1	.	.	2
1805	.	.	.	.	.	.	.	.	1	.	.	.	1
1817	.	1	.	.	.	.	.	.	.	.	.	.	1
1827	.	.	.	.	.	.	.	.	1	.	.	.	1
1831	1	.	.	.	.	.	.	.	.	.	.	.	1
1833		.	.	.	.	.	.	.	.	1	.	.	1
1836	.	.	.	.	1	.	.	.	.	.	.	.	1
1837		1	.	.	.	.	.	.	.	1	4	.	6
1838	.	.	.	.	.	.	.	.	2	.	1	.	3
1839	.	.	.	.	.	.	.	.	2	1	.	.	3
1840	.	.	.	.	1	.	.	.	1	1	.	.	3
1842	.	.	.	.	.	.	.	.	.	.	1	.	1
Total	4	5	12	4	20	5	6	10	15	11	12	4	108

XXXI. AURORAS OBSERVED AT CARLSRUHE, GERMANY, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1779	1	3	2	5	2	.	1	3	1	1	2	2	23
1780	.	1	1	1	1	1	4	5	1	3	1	.	19
1781	.	1	3	1	1	1	.	1	1	1	1	1	12
1782	.	2	.	1	1	.	.	.	.	.	.	.	4
1783	.	.	3	5	2	.	.	.	.	.	.	.	10
1784	.	1	.	.	.	.	.	.	2	.	1	.	4
1786	.	.	.	2	1	.	.	.	.	1	.	.	4
1789	.	.	2	.	.	.	.	2	1	1	.	.	6
1804	.	.	.	.	.	.	.	.	.	1	.	.	1
1817	.	1	2	.	.	.	.	.	.	.	.	.	3
1831	1	.	.	.	.	.	.	.	.	.	.	.	1
Total	2	9	13	15	8	2	5	11	6	8	5	3	87

XXXII. AURORAS OBSERVED AT MONTMORENCI, FRANCE, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1771	.	1	1	2	.	.	.	.	.	.	.	.	4
1772	.	.	1	.	.	.	.	1	.	2	.	.	4
1773	.	.	1	.	.	.	.	.	1	1	.	.	3
1774	.	.	3	.	.	.	.	.	3	.	.	.	6
1775	3	.	.	.	.	.	.	.	1	.	.	.	4
1776	.	.	2	1	.	.	.	1	3	.	.	.	7
1777	1	4	1	1	.	.	.	2	2	1	2	2	16
1778	1	1	3	.	.	1	.	.	3	1	.	2	12
1779	.	2	3	2	2	1	.	1	1	2	2	1	17
1780	.	2	1	.	.	1	2	.	2	.	.	.	8
1781	1	2	4	1	.	.	1	2	4	1	.	.	16
1782	.	.	1	1	1	.	.	.	1	3	.	.	7
1783	.	.	1	3	3	.	.	.	1	4	1	.	13
1784	.	.	.	.	2	.	1	.	1	.	1	.	5
1785	.	.	.	.	.	.	.	.	.	.	2	.	2
1786	.	.	.	.	2	1	1	1	1	2	.	.	8
1787	1	.	1	1	2	1	1	1?	.	1	2	.	11
1788	.	1	.	3	1	.	1?	1	.	1	.	.	8
1789	.	.	1	1	.	.	1	.	1	.	1	.	5
1790–1	.	.	.	.	.	.	.	.	.	.	.	.	0
1792	.	.	.	1	1	.	.	.	.	.	.	.	2
1793	.	.	.	.	.	1	.	1	.	.	.	.	2
1794	.	.	.	1	.	.	.	.	.	.	.	.	1
1795	.	.	.	.	.	.	.	.	.	.	.	.	4
1796	.	.	.	.	.	.	.	.	.	.	.	.	0
1797	.	.	.	.	.	.	.	.	.	.	.	.	3
1798	1	.	.	.	.	.	.	.	.	.	.	.	1
1799	.	.	.	.	.	.	1	.	1	.	.	.	2
1800–2	.	.	.	.	.	.	.	.	.	.	.	.	0
1803	.	.	1	.	.	.	.	.	.	.	.	.	1
1804	.	.	1	.	.	.	.	.	.	1	.	.	2
1805	.	.	.	.	.	.	.	.	1	.	.	.	1
Total	8	13	26	18	14	6	9	11	27	20	11	5	175

XXXIII. AURORAS OBSERVED AT FRANEKER, HOLLAND, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1771	.	1	1	.	2	.	.	1	.	2	2	1	10
1772	.	1	3	2	.	1	.	.	2	5	.	.	14
1773	1	.	4	2	.	1	2	.	3	7	1	2	23
1774	2	.	10	1	5	.	2	5	2	3	3	1	34
1775	8	3	8	7	3	.	2	.	6	.	1	1	39
1776	2	2	1	2	1	.	1	1	7	2	1	1	21
1777	1	2	6	5	3	1	.	3	3	5	4	3	36
1778	4	1	4	.	1	3	1	1	3	2	.	2	22
1779	2	4	3	4	1	.	.	4	2	3	1	3	27
1780	.	1	.	.	.	.	.	.	2	1	.	.	4
1781	.	.	1	.	.	.	.	.	.	.	.	.	1
Total	20	15	41	23	16	6	8	15	30	30	13	14	231

XXXIV. AURORAS OBSERVED AT WITTEMBERG, GERMANY, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb	Mar.	Apr.	May	June	July	Aug	Sept.	Oct.	No	Dec.	Total
1730	1	.	.	.	.	.	1	.	.	2	.	.	4
1731	.	.	.	.	.	.	.	2	1	6	.	.	9
1732	1	2	.	.	.	.	.	1	.	1	.	.	5
1733	.	.	.	.	1	.	1	.	.	.	1	.	3
1734	.	1	.	1	.	.	.	1	.	.	.	.	3
1735	1	1	3	2	.	.		.	.	.	2	.	9
1736	.	.	.	1	.	.	.	.	2	3	.	.	6
1737	.	.	2	1	.	.	.	3	.	.	1	1	8
1738	.	.	.	.	.	.	.	.	.	.	.	1	1
1739	.	1	.	1	.	.	.	.	1	1	.	.	4
1741	1	1	.	.	.	.	.	1	.	2	.	.	5
1742	.	1	3	.	1	.	.	2	2	.	.	2	11
1743	1	.	5	.	.	.	.	.	1	1	.	.	8
1744	.	.	.	1	.	.	.	.	.	.	.	.	1
1745	1	.	.	.	.	.	.	.	.	.	.	.	1
1746	.	.	.	.	.	.	.	.	.	.	1	.	1
1747	1	.	.	.	.	.	.	.	1	.	.	1	3
1748	.	1	.	.	.	.	.	.	.	.	.	1	2
1750	1	3	.	.	1	.	.	1	.	.	.	.	6
1751	.	1	.	.	.	.	.	.	.	.	.	.	1
Total	8	12	13	7	3	0	2	11	8	16	5	6	91

XXXV. AURORAS OBSERVED IN ITALY, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec	Total
1727	.	1	8	.	1	.	.	.	.	2	.	.	12
1728	1	.	1	2	1	.	1	.	1	2	.	1	10
1730	.	1	6	1	.	1	.	.	1	.	1	.	11
1731	.	1	.	.	.	.	.	.	.	1	.	.	2
1732	.	1	1	.	.	.	1	.	.	.	1	.	4
1733	.	.	.	.	.	.	1	.	.	.	.	.	1
1734	.	.	.	1	.	.	.	.	.	.	.	.	1
1735	.	2	1	.	.	.	.	.	.	.	.	.	3
1736	.	.	1	.	1	.	2	.	2	.	.	.	6
1737	2	.	.	.	.	2	.	2	.	.	.	4	10
1738	.	1	.	.	.	.	1	1	.	.	.	.	3
1739	.	.	2	.	.	1	.	.	.	.	1	.	4
1741	1	.	.	.	.	.	.	.	.	2	.	.	3
1743	.	.	1	.	.	.	.	.	.	.	.	.	1
1744	.	.	.	.	.	.	.	.	.	1	.	.	1
1745	.	.	.	.	.	.	.	.	.	2	.	.	2
1747	.	.	.	.	.	.	.	1	1	.	.	1	3
1748	.	.	.	.	.	.	.	.	.	1	.	.	1
1749	.	.	.	.	.	.	.	.	2	1	.	.	3
1750	.	2	.	1	.	.	.	2	.	.	.	1	6
1751	.	.	.	.	.	.	.	1	.	.	.	.	1
Total	4	9	21	5	3	4	6	7	7	12	3	7	88

XXXVI. AURORAS OBSERVED IN NEWFOUNDLAND, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1849	4	8	2	10	1	1	4	4	5	4	3	2	48
1850	1	6	6	1	3	3	8	6	6	9	.	3	52
1851	4	6	6	5	7	1	1	3	5	6	2	5	51
Total	9	20	14	16	11	5	13	13	16	19	5	10	151

XXXVII. AURORAS OBSERVED AT QUEBEC, CANADA, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1848	.	8	5	11	4	1	1	3	3	7	6	3	52
1849	3	12	3	7	1	5	3	1	4	4	2	.	45
1850	.	2	3	3	1	3	6	6	7	5	5	3	44
1851	3	3	3	3	1	1	3	.	5	5	.	1	28
Total	6	25	14	24	7	10	13	10	19	21	13	7	169

XXXVIII. AURORAS OBSERVED AT LONDON, CANADA, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1848	5	4	1	7	2	1	3	2	.	2	3	3	33
1849	.	3	5	4	1	2	3	2	1	5	.	.	26
1850	1	3	3	5	3	.	3	2	5	5	.	.	30
1851	1	2	3	.	.	2	1	2	4	1	.	2	18
Total	7	12	12	16	6	5	10	8	10	13	3	5	107

XXXIX. AURORAS OBSERVED AT SPYDBERG, &c., NORWAY, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1784	1	.	3	3	1	.	.	.	1	5	1	3	18
1785	1	.	3	.	1	.	.	.	3	1	.	3	12
1786	.	3	6	1	.	.	.	.	1	8	5	.	24
1787	6	4	5	2	.	.	.	1	5	4	.	.	27
Total	8	7	17	6	2	0	0	1	10	18	6	6	81

XL. AURORAS OBSERVED AT SAGAN, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1781	1	.	1	.	.	.	.	1	1	3	3	1	11
1782	1	.	3	.	.	.	.	.	1	2	.	.	7
1783	.	.	4	6	2	.	.	.	.	1	.	.	13
1784	.	.	2	.	.	.	.	.	4	.	1	1	8
1785	.	.	1	.	.	.	.	.	.	1	3	.	5
1786	1	1	5	13	1	.	.	.	1	6	.	.	28
1787	2	1	4	5	1	.	2	.	2	9	5	2	33
1788	4	5	2	6	.	.	1	4	7	7	5	1	42
1789	4	1	5	4	1	.	.	3	3	1	4	6	32
1790	4	4	3	1	1	.	.	.	3	1	6	1	24
1791	5	2	1	1	.	1	.	.	.	2	2	1	15
1792	3	.	3	4	2	1	.	.	.	6	2	1	22
Total	25	14	34	40	8	2	3	8	22	39	31	14	240

XLI. AURORAS OBSERVED IN SCANDINAVIA, &c., ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1837	.	.	.	.	.	.	.	.	.	8	12	3	23
1838	17	6	7	.	.	.	.	.	16	17	20	25	108
1839	22	24	24	11	.	.	.	4	12	24	15	13	149
1840	1	.	7	.	.	.	.	.	.	.	.	.	8
Total	40	30	38	11	0	0	0	4	28	49	47	41	288

XLII. AURORAS OBSERVED AT MANNHEIM, GERMANY, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1781	1	3	6	4	.	2	1	2	2	3	1	1	26
1782	4	.	2	.	2	2	1	.	4	1	.	.	16
1783	1	.	2	7	5	.	1	1	.	.	2	1	20
1784	.	.	3	.	.	.	2	.	2	.	1	.	8
1785	.	3	.	2	.	1	1	1	1	1	2	1	13
1786	1	.	2	3	.	1	.	2	3	5	2	1	20
1787	4	1	7	5	1	1	3	3	5	3	5	1	39
1788	2	2	3	1	2	.	2	4	4	2	1	4	27
1789	1	2	3	1	1	.	.	.	1	.	.	1	10
1790	2	1	2	6	.	1	.	1	1	3	1	.	18
1791	2	.	1	1	1	.	1	2	1	.	1	.	10
1792	.	.	2	2	1	.	.	.	4	.	.	.	9
Total	18	12	33	32	13	8	12	16	28	18	16	10	216

XLIII. AURORAS OBSERVED AT COPENHAGEN, DENMARK, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1782	.	.	5	1	1	.	.	.	.	2	1	1	11
1783	.	.	1	4	2	.	.	1	2	1	.	.	11
1784	.	1	.	.	.	.	1	.	1	.	.	.	3
1785	.	.	.	.	.	.	1	.	.	.	.	1	2
1786	.	1	.	3	1	.	1	.	1	1	1	.	9
1787	1	2	3	3	.	.	.	.	.	1	.	.	10
1788	.	1	.	1	.	.	.	.	.	.	.	.	2
Total	1	5	9	12	4	0	3	1	4	5	2	2	48

XLIV. AURORAS OBSERVED IN HOLLAND, ARRANGED BY YEARS AND MONTHS.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct	Nov.	Dec.	Total.
Total	49	47	92	103	110	34	37	59	64	74	47	34	750

XLV. AURORAS OBSERVED AT RATISBON, GERMANY, ARRANGED BY YEARS AND MONTHS.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1781	1	1	1	.	1	3	.	.	.	1	.	.	8
1782	.	.	1	.	.	.	.	.	1	1	.	.	3
1783	.	.	.	2	1	.	1?	3	.	.	1	.	8
1784	.	.	1?	1?	.	1	.	.	.	.	.	.	3
1786	.	.	1	3	.	.	.	.	.	.	.	.	4
1787	.	.	2	1	2	.	.	1	.	6	2	.	14
1788	.	1	.	2	1	.	1	.	1	.	.	.	6
1789	.	.	2	.	1	3	.	.	.	.	.	.	6
1790	.	.	1	.	.	.	.	.	.	.	.	.	1
1791	.	1	.	.	.	.	.	.	.	.	.	.	1
Total	1	3	9	9	6	7	2	4	2	8	3	0	54

XLVI. AURORAS OBSERVED AT PRAGUE, AUSTRIA, ARRANGED BY YEARS AND MONTHS.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug..	Sept.	Oct.	Nov.	Dec.	Total.
1782	1	2	1	.	.	.	.	.	1	.	.	.	5
1783	.	.	1	4	2	.	.	2	1	1	.	1	12
1784	1	.	.	.	.	.	.	1	1	.	1	.	4
1786	1	.	2	2	1	.	1	.	.	1	.	.	8
1787	2	2	.	.	1	1	.	.	1	4	2	.	13
1790	1	.	.	.	2	.	1	.	.	.	.	.	4
1791	.	.	.	.	.	.	.	.	.	1	.	.	1
Total	6	4	4	6	6	1	2	3	4	7	3	1	47

GENERAL CATALOGUE OF AURORAS ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total*
BEFOR													
1309	6	10	9	4	2	.	.	5	3	5	4	13	168
1309	.	.	.	.	.	.	.	.	.	.	.	.	1
1325	.	.	.	.	1	.	.	.	.	.	.	.	1
1351	.	.	.	.	.	.	.	.	.	.	.	1	1
1352	.	.	.	.	.	.	.	.	.	1	.	.	1
1353	.	.	.	.	.	.	.	1	.	.	.	.	1
1354	.	.	1	.	.	.	.	.	.	.	.	.	1
1361	.	.	.	.	.	.	.	.	.	.	.	1	1
1375	.	.	.	.	.	.	.	.	.	.	.	.	1
1399	.	.	.	.	.	.	.	.	.	.	.	.	1
1437	.	.	1	.	.	.	.	.	.	.	.	.	1
1446	.	1	.	.	.	.	.	.	.	.	.	.	1
1461	.	.	.	.	.	.	1	.	.	.	.	.	1
1465	.	.	.	.	.	.	.	.	.	.	1	.	1
1499	.	.	.	.	1	.	.	.	.	.	.	.	1
1514	1	.	.	.	.	.	.	.	.	.	.	.	1
1518	1	.	.	.	.	.	.	.	.	.	.	.	2
1520	.	.	.	.	.	.	.	.	1	.	.	1	2
1527	.	.	.	.	.	.	.	1	.	1	.	1	3
1529	1	.	.	.	.	.	.	.	.	.	.		2
1531?	.	.	.	.	.	.	.	.	.	.	.	.	1
1532?	.	.	.	.	.	.	.	.	.	.	.	.	1
1534	.	.	.	.	.	1	.	.	.	.	.	.	1
1535	.	.	.	.	1	.	.	.	.	.	.	.	1
1536	.	1	.	.	.	.	.	.	.	.	.	.	1
1537	.	1	.	.	.	.	.	.	.	.	.	.	1
1538?	.	.	.	.	.	.	.	.	.	.	.	.	1
1541	1	.	.	.	.	.	.	.	.	.	.	.	1
1543	.	.	.	.	1	.	.	.	.	.	.	.	1
1545	.	1	.	1	.	.	.	.	.	.	.	.	2
1546	.	1	.	.	.	.	.	.	.	.	.	.	1
1547	.	.	.	.	.	.	1	.	.	1	.	.	2
1548	.	.	.	.	.	.	.	.	.	.	1	.	1
1549	.	.	.	1	.	.	.	.	1	.	.	.	2
1551	.	1	.	.	.	.		.	1	1	.	.	3
1554	.	1	.	.	.	.	.	1	.	.	.	.	2
1555	.	.	1	.	.	.	.	.	1	.	.	.	2
1556	1	.	.	.	.	.	.	.	1	.	.	.	2
1557	.	.	1	.	.	.	.	.	.	.	.	1	2
1560	.	1	.	1	.	.	.	.	.	.	.	.	2
1561	2	.	2	.	.	.	.	.	.	.	.	.	4
1562	.	.	.	.	.	.	.	.	.	.	.	.	1
1563	1	1	.	.	.	.	.	.	.	.	.	.	2
1564	.	1	.	.	.	.	.	.	1	1	2	.	5
1565	.	.	.	.	.	.	.	.	.	.	.	1	1
1567	.	1	.	1	.	.	.	.	.	.	.	.	2
1568	.	.	.	2	.	.	.	.	.	1	.	.	3

* The total number of the year sometimes exceeds the sum of those placed in the monthly columns because auroras were observed when the month was not mentioned, but the year only.

GENERAL CATALOGUE OF AURORAS. *Continued.*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1569	1	.	1	.	.	.	.	.	.	.	.	.	2
1571	.	.	5	.	.	.	.	.	.	.	.	.	5
1572	2	.	1	1	.	.	.	.	.	.	.	.	4
1573	1	3	.	2	.	.	.	.	.	.	1	.	7
1574	1	.	.	.	.	.	.	1	.	.	2	1	5
1575	.	1	.	.	.	.	.	.	.	1	.	.	2
1576	2	1	.	.	.	1	.	.	.	.	.	5	9
1577	.	.	.	.	.	.	.	.	.	.	.	1	1
1580	.	.	1	2	.	.	.	.	2	2	.	2	9
1581	2	1	2	1	.	.	.	.	1	1	.	.	8
1584	.	1	.	.	.	.	.	.	.	.	.	.	1
1585	.	.	.	.	.	.	.	.	.	.	.	2	2
1586	.	1	.	.	.	.	.	.	.	.	.	.	1
1588	1	3	.	.	.	.	.	.	.	.	.	1	5
1589	1	.	.	.	.	.	.	.	.	.	.	.	1
1590	.	.	2	1	.	.	.	.	.	.	.	.	3
1591	.	.	1	.	.	.	.	.	.	.	.	.	1
1592	.	.	1	.	.	.	.	.	.	.	.	.	1
1593	.	.	.	.	.	.	.	.	.	7	.	.	7
1596	.	.	.	1	.	.	.	.	.	.	.	.	1
1599	.	.	.	.	.	.	.	1	.	.	.	.	1
1600	.	.	.	.	.	.	.	.	.	.	.	1	1
1602	.	.	.	.	.	1	.	.	.	.	.	.	1
1603	.	.	.	.	.	.	.	.	1	.	1	.	2
1605	.	.	.	.	.	.	.	.	.	.	1	1	2
1606	.	.	.	.	.	.	.	.	2	.	.	.	2
1607	.	.	.	.	.	.	.	.	.	.	1	.	1
1608	.	.	.	.	.	.	.	.	.	.	1	.	1
1609	.	.	2	.	.	.	.	.	.	.	.	.	2
1612	.	.	.	.	.	.	.	1	.	.	.	.	1
1614	.	.	.	.	.	.	1	.	.	.	.	.	1
1615	.	.	.	.	.	.	.	.	.	1	.	.	1
1621	.	1	1	.	.	.	.	.	2	1	.	.	5
1622	1	.	.	.	.	1	.	.	.	.	.	.	2
1623	3	1	.	.	2	.	.	.	.	.	.	1	7
1624	.	.	.	1	1	1	.	.	.	.	.	.	3
1625	.	.	.	.	.	.	.	.	2	1	1	.	4
1626	.	1	.	.	1	1	.	1	2	.	.	.	6
1627	2	.	.	.	.	.	.	.	.	.	.	.	2
1628	1	.	.	2	.	.	.	.	.	.	.	4	7
1629	2	.	1	.	.	1	.	1	3	6	.	.	14
1630	.	2	.	.	.	2	.	.	.	.	.	.	4
1632	.	.	.	.	.	.	.	.	.	.	1	.	1
1633	.	.	.	.	1	1	.	.	.	.	.	1	3
1634	1	2	.	.	.	.	.	.	.	.	.	.	3
1637	.	.	.	.	.	.	.	1	.	.	.	.	1
1638	1	.	.	.	.	.	.	.	.	.	.	.	1
1640	1	.	.	.	.	.	.	.	.	.	.	.	1

GENERAL CATALOGUE OF AURORAS. *Continued.*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1643	.	.	.	.	.	.	.	.	.	.	1	.	1
1644	.	.	1	.	.	.	.	.	.	.	.	.	1
1645	.	.	.	1	.	.	.	.	.	.	.	.	1
1646	.	.	.	.	.	.	.	.	.	.	1	.	1
1650	1	.	.	.	.	.	.	.	.	.	.	.	1
1654	.	.	1	.	.	.	.	.	.	.	.	.	1
1655	.	.	.	.	.	.	1	.	.	.	.	.	1
1657	1	.	.	1	.	.	.	.	.	.	.	.	2
1660	.	.	.	.	.	.	.	.	.	.	.	1	1
1661	1	.	.	1	.	.	.	.	.	.	.	.	2
1662	.	.	.	.	.	.	.	.	.	.	.	1	1
1663	.	.	.	.	.	.	.	.	.	.	1	.	1
1664	.	.	.	1	.	.	.	.	.	.	.	.	1
1665	.	.	.	1	.	.	.	1	.	.	.	.	2
1666	1	.	.	.	.	.	.	.	.	.	.	.	1
1671	.	.	.	.	.	.	.	.	.	.	1	.	1
1672	1	.	.	.	.	.	.	.	.	.	.	.	1
1676	.	1	1	.	.	.	.	.	.	.	.	.	2
1677	.	.	.	.	.	.	.	.	.	.	1	1	2
1680	.	.	.	.	.	.	.	.	1	.	.	.	1
1682	.	.	.	.	.	.	.	.	.	.	1	1	2
1683	1	.	.	.	.	.	.	1	.	.	.	.	2
1684	.	.	1	.	.	.	.	.	.	.	1	.	2
1685	.	.	.	1	.	.	.	.	.	.	.	.	1
1686	.	1	.	.	.	1	1	.	.	1	.	.	4
1687	.	.	.	.	.	.	.	.	.	.	.	.	1
1690	.	.	.	.	.	.	.	.	.	1	1	1	3
1692	.	.	.	1	1	.	.	.	1	.	.	.	3
1693	.	.	.	.	.	.	.	.	.	.	2	.	2
1694	.	.	1	1	.	.	.	.	.	.	.	.	2
1695	.	.	.	.	.	.	.	.	.	3	1	.	4
1696	.	.	.	.	1	.	.	.	1	.	2	.	4
1697	.	.	.	.	.	.	.	1	.	.	.	.	1
1698	.	2	.	.	1	.	.	.	1	.	2	3	9
1699	1	3	.	4	.	2	2	7	7	5	6	3	40
1701	.	.	.	.	.	.	.	.	.	.	.	.	1
1702	.	.	.	.	1	.	.	.	.	.	.	.	1
1703	6	.	.	.	.	.	.	.	.	.	.	.	6
1704	.	.	.	.	.	.	.	.	.	.	.	.	1
1706	.	.	.	.	.	.	.	.	1?	.	.	.	1
1707	.	3	6	.	.	.	.	2	.	3	2	.	16
1708	.	.	.	.	.	.	.	2	2	.	.	.	4
1709	.	.	.	.	.	.	.	.	.	1	1	1	3
1710	.	.	.	.	.	.	.	.	1	.	1	1	3
1711	.	.	1	.	.	.	.	.	.	.	.	.	1
1714	.	.	.	.	.	.	.	.	.	1	.	.	1
1716	.	.	2	4	5	.	.	.	.	.	.	2	13
1717	4	2	.	4	.	.	.	3	3	1	.	.	17

GENERAL CATALOGUE OF AURORAS. *Continued.*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1718	.	2	6	1	2	1	.	1	4	4	2	6	29
1719	.	3	5	4	.	.	.	.	3	5	10	6	36
1720	4	6	2	1	.	.	.	1	2	1	6	6	29
1721	3	5	3	.	.	.	.	.	4	5	3	.	23
1722	8	7	5	1	1	1	.	.	9	12	7	5	56
1723	6	1	9	5	.	.	.	1	.	1	4	2	29
1724	4	2	3	1	2	.	.	5	3	2	3	4	29
1725	5	5	1	3	1	.	.	.	5	7	1	5	33
1726	2	1	9	2	.	.	.	.	3	10	6	14	47
1727	7	6	14	4	1	.	.	5	9	15	15	12	88
1728	6	10	14	7	3	2	5	7	12	21	14	9	110
1729	9	10	7	7	8	2	1	1	8	8	6	4	71
1730	5	9	15	10	4	1	5	6	17	18	20	9	119
1731	3	3	7	3	2	.	.	7	9	13	9	11	67
1732	13	14	18	14	3	2	3	5	14	20	14	7	127
1733	3	3	6	4	5	.	3	5	3	8	5	6	51
1734	5	9	10	5	12	1	4	5	16	20	5	3	95
1735	3	5	9	9	.	.	.	5	9	7	5	7	59
1736	2	9	3	3	1	.	2	5	12	18	9	11	75
1737	18	8	7	8	.	2	.	5	8	6	6	7	75
1738	1	3	4	2	.	.	1	2	2	3	5	10	33
1739	5	6	15	8	3	1	.	7	13	7	8	3	76
1740	7	5	10	.	1	1	1	3	5	7	4	3	47
1741	9	10	13	11	.	.	2	11	11	19	9	10	105
1742	3	8	12	10	1	.	.	8	10	12	4	8	76
1743	5	5	11	8	1	.	1	5	7	8	6	3	60
1744	1	2	6	2	.	4	.	.	2	2	1	9	29
1745	6	8	.	.	.	1	.	.	2	3	2	5	27
1746	7	12	9	1	.	2	1	1	6	14	10	6	69
1747	8	5	9	5	1	.	1	3	4	2	1	10	49
1748	8	9	10	4	2	2	.	6	9	4	2	9	65
1749	2	9	11	12	3	1	1	1	6	6	3	3	58
1750	4	8	7	5	3	2	.	7	4	2	5	4	51
1751	2	5	1	1	.	2	.	1	5	5	4	8	34
1752	9	5	11	3	.	.	1	5	3	9	5	5	56
1753	.	3	10	8	.	.	.	2	6	.	1	5	35
1754	1	2	5	2	.	.	.	.	1	3	3	1	18
1755	1	3	.	.	.	.	.	.	1	3	2	1	11
1756	2	1	2	.	.	.	.	.	7	3	.	.	15
1757	1	.	1	.	.	.	.	1	4	.	2	.	9
1758	1	.	3	1	1	4	.	.	.	.	.	.	10
1759	.	6	5	3	.	.	.	5	13	3	9	12	56
1760	6	9	6	12	1	.	1	5	1	9	8	4	62
1761	9	11	6	8	1	.	.	6	7	3	5	2	58
1762	2	2	3	4	3	.	.	5	3	2	5	10	39
1763	.	.	1	4	2	.	1	2	1	2	2	.	15
1764	2	6	2	2	1	3	1	2	1	3	1	1	25
1765	1	2	4	1	.	.	2	3	1	1	1	1	17
1766	.	.	.	.	.	.	.	.	.	1	.	.	1

GENERAL CATALOGUE OF AURORAS. *Continued.*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1767	.	2	.	2	1	.	2	1	.	.	.	1	9
1768	2	2	.	.	.	.	1	2	1	3	2	3	16
1769	1	2	1	1	.	3	4	1	3	9	4	3	32
1770	2	8	7	7	2	.	4	5	3	1	3	2	44
1771	5	7	9	4	7	2	2	5	6	8	7	3	65
1772	5	6	10	9	.	2	4	1	5	10	4	3	59
1773	13	6	12	7	8	6	4	3	9	11	7	3	89
1774	3	2	16	9	11	6	8	12	13	11	6	4	101
1775	13	8	11	10	3	.	3	2	8	3	1	1	63
1776	3	1	4	4	4	2	1	1	13	4	1	1	39
1777	3	7	12	9	6	1	1	6	8	7	8	11	79
1778	7	8	12	10	2	5	4	3	16	8	2	10	87
1779	7	14	9	16	15	6	4	10	14	10	11	6	122
1780	.	5	5	3	1	3	5	2	9	6	13	6	58
1781	10	4	10	12	6	7	3	12	11	8	7	8	98
1782	7	7	10	8	12	5	4	8	13	11	3	2	90
1783	5	6	16	17	12	4	3	7	3	8	6	3	90
1784	6	3	10	7	4	5	5	6	6	6	2	6	66
1785	5	7	5	9	4	3	4	5	11	8	6	8	75
1786	5	7	20	21	20	6	14	12	17	19	16	17	174
1787	23	18	18	18	14	13	11	8	12	19	16	12	182
1788	12	11	12	17	17	7	9	15	18	20	14	11	163
1789	7	8	14	14	11	12	15	15	17	13	19	14	159
1790	10	12	14	15	13	6	4	3	8	11	17	7	120
1791	10	4	9	9	5	3	6	3	4	12	10	8	83
1792	7	8	11	7	10	2	4	5	5	11	5	6	81
1793	4	3	4	3	.	1	.	3	2	1	1	.	22
1794	2	.	2	3	.	.	.	.	.	.	1	2	10
1795	.	.	1	.	1	.	.	.	2	3	.	.	7
1796	.	1	.	1	.	.	.	.	.	.	.	.	2
1797	1	5	3	1	.	.	.	.	.	.	4	.	14
1798	1	1	.	.	.	.	.	.	.	.	.	.	2
1799	1	2	.	.	.	.	1	.	1	1	.	.	6
1800	.	.	.	.	.	.	.	.	.	.	2	1	3
1801	2	1	.	.	.	.	.	.	.	4	.	1	8
1802	1	1	3	3	.	1	1	.	2	.	.	1	13
1803	1	.	1	2	.	.	.	1	3	1	.	1	10
1804	.	1	1	2	2	.	.	.	1	2	3	.	12
1805	2	1	1	1	2	.	.	1	4	3	6	1	22
1806	1	1	1	1	.	.	.	1	1	2	1	1	10
1807	1	.	1	2	1	.	.	.	.	.	.	.	5
1808	.	.	1	.	.	.	2	.	.	.	.	.	3
1809	1	.	1	.	.	1	.	.	.	.	.	.	3
1810	.	.	.	1	.	.	.	.	.	.	.	.	1
1811	.	.	4	.	.	.	.	.	.	.	.	.	4
1812	.	.	.	.	.	.	.	.	.	.	.	.	0
1813	.	.	.	.	.	.	.	.	.	.	.	.	0
1814	1	.	.	3	.	.	.	.	2	1	.	.	7
1815	.	.	.	3	.	.	.	.	.	.	.	.	3

GENERAL CATALOGUE OF AURORÆ. (Continued.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Tot.
1816	.	.	.	.	.	.	.	.	3	1	.	.	4
1817	.	6	6	5	.	.	.	1	2	1	.	.	21
1818	.	1	.	.	3	5	.	.	8	7	.	.	24
1819	.	2	2	.	.	.	.	1	2	11	11	8	37
1820	8	9	15	15	8	1	.	2	3	6	8	28	103
1821	16	23	24	16	8	.	.	3	.	.	6	11	110
1822	5	2	.	3	.	.	1	.	.	1	1	1	17
1823	1	1	1	1	.	.	.	1	.	.	.	.	5
1824	1	.	.	.	.	.	1	2	3	.	5	8	20
1825	10	9	5	2	.	.	.	6	5	1	5	2	48
1826	7	6	12	5	.	.	.	2	4	5	8	1	56
1827	8	8	2	2	.	.	.	7	6	7	6	12	58
1828	7	4	.	2	.	2	1	2	9	12	5	12	56
1829	8	1	7	1	4	7	1	4	6	14	8	10	74
1830	5	5	6	7	12	7	5	13	18	16	19	11	118
1831	10	6	17	9	4	7	12	5	3	3	1	2	79
1832	3	1	2	5	3	4	.	4	5	4	6	1	38
1833	2	3	4	3	4	3	3	4	14	8	15	16	79
1834	28	15	22	23	2	1	2	3	3	11	20	28	158
1835	20	14	12	1	.	2	1	2	7	2	4	3	68
1836	.	3	1	10	5	10	10	11	4	7	9	1	71
1837	6	3	6	6	5	4	7	8	16	11	16	10	100
1838	20	13	12	7	4	3	5	4	19	19	21	25	152
1839	23	27	25	20	12	3	3	10	18	25	19	17	203
1840	12	13	19	11	9	6	5	12	10	12	12	15	136
1841	13	17	14	12	7	5	10	15	13	20	24	25	172
1842	20	21	20	18	1	7	9	7	20	16	20	18	177
1843	19	17	19	14	8	8	8	4	19	15	22	17	170
1844	25	17	18	20	9	3	1	6	16	17	22	18	174
1845	20	17	24	10	4	5	7	9	15	16	13	15	155
1846	17	14	14	11	14	3	7	10	17	20	15	14	165
1847	20	7	17	14	3	2	3	6	12	20	20	15	141
1848	19	20	20	18	14	7	14	14	12	23	27	28	216
1849	20	23	23	23	12	17	15	11	18	22	17	20	221
1850	19	18	24	14	8	8	11	15	17	19	6	18	177
1851	15	17	7	8	9	3	7	7	16	14	7	12	122
1852	10	10	15	13	12	6	10	5	18	10	11	18	138
1853	14	8	14	9	11	7	9	7	11	3	11	9	113
1854	9	11	10	7	9	2	8	3	12	5	6	5	87
1855	3	5	5	6	5	.	3	4	4	9	8	4	56
1856	2	2	5	1	.	3	.	3	2	4	2	3	27
1857	2	.	.	2	.	.	.	.	8	4	7	10	33
1858	6	14	17	3	2	.	2	4	5	11	3	16	92
1859	9	9	3	9	1	.	1	4	9	11	4	8	71
1860	5	6	11	6	1	2	3	16	8	5	4	5	75
1861	6	7	13	3	.	1	.	3	2	4	2	6	47
1862	3	1	1	1	1	.	1	7	10	9	2	4	46
1863	3	7	3	7	1	.	.	1	4	6	3	.	35
1864	.	.	.	.	.	1	.	1	1	.	1	.	4
Total	532	570	1,178	915	547	315	373	670	1015	1110	964	1167	9385

XLVII. NUMBER OF AURORAS OBSERVED EACH MONTH IN THE WESTERN HEMISPHERE.

Place.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	Total.
Newfoundland,	9	20	14	16	11	5	13	13	16	19	5	10	151
Quebec,	6	25	14	24	7	10	13	10	19	21	13	7	169
London, Can.,	7	12	12	16	6	5	10	8	10	13	3	5	107
Toronto,	21	37	34	46	35	24	31	25	33	43	34	26	389
Jakobshavn,	27	24	17	1	0	0	0	0	17	28	34	37	185
Gothaab,	61	60	50	21	0	0	0	5	53	45	71	64	430
New York State,	76	89	110	132	89	80	106	125	141	117	75	65	1205
New Haven,	63	59	72	67	62	46	72	66	97	62	86	61	813
Newberry,	23	34	28	30	6	2	3	11	32	30	10	9	218
Providence,	15	17	14	13	18	7	10	7	21	21	14	3	160
Burlington,	8	6	9	8	12	5	6	3	8	3	3	3	74
St. Martin,	6	9	7	9	9	4	14	6	14	3	2	6	89
Wilmington,	6	1	4	1	5	5	6	5	10	3	3	4	53
Worcester,	19	13	27	25	10	9	12	19	30	22	15	11	212
Salem,	9	14	18	17	15	15	30	17	21	22	12	8	198
Boston,	2	4	1	5	1	2	2	1	6	2	6	4	36
Cambridge,	19	27	37	39	21	10	29	20	45	33	17	19	316
Cambridge,	17	31	46	33	24	26	44	40	49	32	31	17	390
Aggregates,	394	482	514	503	331	255	401	381	622	519	434	359	5195

XLVIII. NUMBER OF AURORAS OBSERVED EACH MONTH IN THE EASTERN HEMISPHERE.

Place.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	Total.
Prague,	6	4	4	6	6	1	2	3	4	7	3	1	47
Ratisbon,	1	3	9	9	6	7	2	4	2	8	3	0	54
Holland,	49	47	92	103	110	34	37	59	64	74	47	34	750
Copenhagen,	1	5	9	12	4	0	3	1	4	5	2	2	48
Mannheim,	18	12	33	32	13	8	12	16	28	18	16	10	216
Scandinavia,	40	30	38	11	0	0	0	4	28	49	47	41	288
Sagan,	25	14	34	40	8	2	3	8	22	39	31	14	240
Spydberg,	8	7	17	6	2	0	0	1	10	18	6	6	81
Italy,	4	9	21	5	3	4	6	7	7	12	3	7	88
Wittemberg,	8	12	13	7	3	0	2	11	8	16	5	6	91
Franeker,	20	15	41	23	16	6	8	15	30	30	13	14	231
Montmorenci,	8	13	26	18	14	6	9	11	27	20	11	5	168
Carlsruhe,	2	9	13	15	8	2	5	11	6	8	5	3	87
Paris,	4	5	12	4	20	5	6	10	15	11	12	4	108
Berlin,	21	37	55	48	39	2	10	10	22	45	29	13	331
Upsal,	85	131	152	75	7	2	4	72	126	146	109	109	1018
Brussels,	12	13	18	22	38	23	23	11	16	23	17	15	231
St. Petersburg,	70	100	179	152	42	13	15	62	145	146	83	79	1086
Stockholm,	27	34	50	56	13	0	0	19	44	39	34	25	341
Christiania,	46	61	75	60	3	0	1	35	78	65	55	55	534
Dunse,	33	20	18	18	3	0	2	14	43	34	30	23	238
Makerstoun,	22	26	28	16	6	0	0	7	16	29	23	11	184
Plymouth, Eng.,	8	7	23	12	6	1	8	8	10	15	13	9	120
Great Britain,	21	19	23	12	3	2	1	3	35	23	21	22	185
Kendall, &c.,	18	18	26	32	21	5	2	21	23	36	38	10	250
Hammerfest,	19	16	8	0	0	0	0	0	4	9	16	19	91
Abo, &c.,	66	87	99	61	9	0	2	28	98	97	74	61	682
Jena,	2	9	4	10	4	2	4	8	14	15	6	6	84
Aggregates,	641	763	1120	865	407	125	167	459	929	1037	752	604	7872

XLIX. TIMES OF MAXIMA AND MINIMA ARRANGED GEOGRAPHICALLY.

Place.	Max.	Min.	Max.	Min.	Number.	Years.	Authority.
Fort Reliance,	?	?	?	?	196	1833–1835	Hough.
Jakobshavn,	?	?	?	?	185	1840–1851	Rudolph.
Gothaab,	?	?	?	?	430	1841–1846	Block.
Newfoundland,	Feb.	June	Oct.	?	151	1849–1851	Lefroy.
Quebec,	Feb.	May	Oct.	Jan.	169	1848–1851	Lefroy.
London, Canada,	April	June	Oct.	?	107	1848–1851	Lefroy.
St. Martin,	?	June	Sept. ?	Nov. ?	89	1853–1854	Smallwood.
Toronto,	April	June	Oct.	Jan.	389	1848–1851	Lefroy.
Burlington,	?	?	?	?	74	1852–1853	Thompson.
Newberry,	Feb.	June	Sept.	Dec.	218	1830–1862	Johnson.
Salem,	March ?	June	Oct. ?	Dec.	198	1786–1820	Holyoke.
Providence,	Feb.	June	Sept. ?	Dec.	160	1832–1860	Caswell.
Boston,	?	?	?	?	36	1818–1848	Hale.
Cambridge,	March	June	Sept.	Dec. ?	706	1742–1864	Lovering, &c.
Worcester,	March	June	Sept.	Dec.	212	1839–1862	Woodward, &c.
New Haven,	March	June	Sept.	Dec.	813	1763–1854	Herrick, &c.
New York State,	April	June	Sept.	Dec.	1205	1826–1851	Hough.
Wilmington,	?	?	?	?	53	1827–1833	Gibbon.

L. TIMES OF MAXIMA AND MINIMA ARRANGED GEOGRAPHICALLY.

Place.	Max.	Min.	Max.	Min.	Number.	Years.	Authority.
Scandinavia,	?	?	?	?	288	1837–1840	Lottin, &c.,
Abo, &c.,	March	June	Sept.	Dec.	682	1748–1843	Hallström,
Helsingfors,	March	June	Sept.	Jan.	30	1832–1837	Argelander,
Spydberg,	March	June ?	Oct.	?	81	1784–1787	Wilse,
Hammerfest,	?	?	?	?	91	1850–1861	Noodt,
Christiania,	March	June	Sept.	Jan.	534	1837–1853	Hansteen,
Stockholm,	April	June ?	Sept.	Dec.	341	1783–1792	Nicander,
St. Petersburg,	March	June	Oct.	Jan.	1086	1726–1861	Kraft, Euler, &c.
Upsal,	March	June	Oct.	Jan.	1018	1716–1762	Celsius, &c.,
Dunse,	?	June	Sept.	?	238	1838–1847	Stevenson,
Makerstoun,	March	June ?	Oct.	Dec.	184	1843–1849	Broun,
Copenhagen,	April	June	Oct.	Jan.	48	1782–1788	Bugge,
Kendall, &c.	April	July	Nov.	Dec.	250	1786–1793	Dalton,
G. Britain,	March	July	Sept.	Jan. ?	185	1794–1834	Dalton,
Berlin,	March	June	Oct.	Dec.	331	1707–1789	Kirch, Beguelin,
Leyden, Utrecht, &c.	May	June	Oct.	Dec.	750	1716–1744	Musschenbroek,
Franeker,	March	June	Sept. ?	Nov.	231	1771–1781	Van Swinden,
Jena,	?	June	Oct.	Jan.	84	1770–1796	Zeissing, Succow,
Mannheim,	March	June	Sept.	Dec.	216	1781–1792	Hemmer,
Sagan,	April	June	Oct.	Dec.	240	1781–1792	Preus,
Brussels,	May	Aug.	Oct.	Jan.	231	1778–1851	Mann, Quetelet,
Plymouth,	March	June	Oct.	Jan.	120	1728–1748	Huxham,
Prague,	?	June	Oct.	Dec.	47	1782–1791	Strnad,
Carlsruhe,	April	June	Aug. ?	Jan.	87	1779–1831	Eisenlohr,
Ratisbon,	April ?	July	Oct.	Dec.	54	1781–1791	Heinrich,
Paris,	March	June	Sept.	Dec. ?	108	1784–1842	Cassini, Bouvard,
Montmorenci,	March	June	Sept.	Dec.	168	1771–1805	Cotte,
Wittemberg,	March	June	Oct.	?	91	1730–1751	Weidler,
Italy,	March	May	Oct.	?	88	1727–1751	Beccari, Zanotti,

LI. COMPARISON OF DIFFERENT PLACES FOR THE SAME EPOCH.

1786–1820.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Salem,	9	14	18	17	15	15	30	17	21	22	12	8	198
Cambridge,	2	5	15	10	9	4	13	12	12	13	6	3	104
New Haven,	3	5	14	7	15	11	16	11	13	6	5	4	110
St. Petersburg,	1	8	20	14	2	0	1	9	14	19	6	3	97
G. Britain,	25	29	34	38	22	5	2	21	34	45	46	16	317
Brussels,	4	7	12	12	28	15	17	8	6	9	3	7	128
Paris,	3	4	11	4	14	4	6	10	9	7	5	4	81
Montmorenci,	2	1	4	7	6	3	5	4	4	5	3	0	44
1742–1779.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Cambridge,	14	24	25	20	11	21	31	28	32	15	21	12	254
St. Petersburg,	36	49	72	77	17	3	2	19	49	51	39	36	450
1742–1793.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Cambridge,	17	31	46	33	24	26	44	40	49	32	31	17	390
St. Petersburg,	41	60	104	110	32	3	2	33	80	87	50	47	649
1742–1864.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Cambridge,	36	58	83	72	45	36	73	60	94	65	48	36	706

LII. NUMBER OF AURORAS ON EACH DAY OF THE YEAR.

Day.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1	34	29	36	33	28	12	13	14	28	38	30	30	325
2	32	35	42	42	29	14	13	18	25	39	38	36	363
3	35	34	34	36	16	12	15	17	29	45	32	31	336
4	28	33	35	38	23	11	12	19	26	37	33	35	330
5	25	24	38	30	19	14	15	8	31	37	32	34	307
6	32	34	39	37	19	13	7	17	34	35	35	34	336
7	22	36	29	40	21	15	18	9	33	38	34	41	336
8	33	27	34	30	15	9	10	10	33	44	32	37	314
9	34	36	40	38	16	12	14	11	36	39	34	27	337
10	29	37	36	36	15	15	14	20	42	31	30	37	342
11	34	41	33	36	15	8	13	18	30	28	35	25	316
12	37	35	42	44	19	13	18	19	38	38	34	33	370
13	42	30	42	34	19	12	13	16	40	33	43	40	364
14	28	32	46	41	21	13	8	26	30	39	40	35	359
15	26	36	42	40	13	11	11	17	43	36	37	41	353
16	28	42	48	35	17	12	11	20	30	36	32	34	345
17	39	38	43	32	23	11	8	26	43	35	41	41	380
18	32	44	44	36	15	8	10	16	37	35	42	42	361
19	30	36	43	35	11	9	12	25	40	40	43	38	362
20	34	36	42	37	17	8	13	21	37	39	31	37	352
21	32	35	35	28	12	7	10	32	33	36	33	29	322
22	29	43	36	23	18	8	7	32	44	41	31	36	348
23	30	40	33	24	18	4	12	24	38	42	33	29	327
24	28	37	30	30	14	9	12	22	52	38	28	26	326
25	30	26	40	19	10	9	14	25	41	33	29	27	303
26	24	40	46	19	11	10	7	26	39	35	30	33	320
27	35	42	37	25	10	9	16	27	41	43	33	25	343
28	35	38	43	16	12	12	15	25	38	36	29	35	334
29	33	7	44	19	15	10	13	35	32	40	29	30	307
30	33		45	23	16	11	8	31	41	30	24	35	297
31	28		38		14		16	32		38		35	201
Total.	971	1003	1215	956	521	321	378	658	1084	1154	1007	1048	10316

NOTE. — This table includes some auroras to be published in a supplement.

The foregoing catalogue of auroras may be employed in the discussion: I. of the *daily* periodicity; II. of the *yearly* periodicity; and III. of the *secular* periodicity of the aurora.

I. The record in most cases is silent as to the hour of the day at which the auroral display reached its height. I have not mentioned it even when it is known, as I had in view the yearly and secular periodicities, especially the last. Olmsted[1] says that the maximum of brilliancy arrives between 10 and 11 o'clock, P. M., and that inferior exhibitions terminate before midnight. Quetelet[2] agrees with him that none occur in the morning. Bravais recognized the same law as holding good within the polar circle, where daylight cannot interfere with the visibility of the aurora.[3] Broun has published a table of the number of auroras observed at Makerstoun during the different hours of the night, for each month separately, and also for the whole year. The maximum hour is about 9 o'clock P. M. at all seasons, irrespective therefore of twilight.[4] On the other hand, the remark of Simpson, on page 124 of this memoir, is deserving of notice.

II. Mairan deduced from his catalogue of 1441 auroras that the numbers of those which appeared when the earth was in perihelion and aphelion were to each other in the ratio of 7 to $1\frac{3}{2}\frac{4}{6}\frac{}{4}$, or of 7 to $2\frac{9}{5}\frac{5}{5}\frac{}{3}$, or of 9 to $4\frac{3}{9}\frac{3}{7}\frac{3}{2}$, according as the perihelion and aphelion comprised each a period of two months, four months, or six months. The number of auroras seen when the earth was in the ascending node of the sun's equator is to the number seen when the earth was in the descending node as 9 to 2: each node embracing a period of two months. More even had been observed when the earth was at the ascending node of the sun's equator than when it was in perihelion, in the ratio of 7 to $6\frac{2}{3}\frac{4}{0}\frac{}{4}$. The number at the descending node was to the number at the aphelion as 9 to $5\frac{1}{6}\frac{}{7}$. Then, again, Mairan divides the orbit of the earth into two parts by the line of apsides, and he finds the number of auroras in that part which contains the ascending signs and the number of those in the other half in the ratio of 9 to $7\frac{2}{7}\frac{4}{9}\frac{5}{4}$. The numbers at the two equinoxes are almost the same, if each equinox is made to embrace two months. The number of auroras is also nearly the same in the neighborhood of those two places of the earth's orbit which are characterized by being 90° from the nodes of the sun's equator. All these various comparisons were made by Mairan in order to sustain his theory of the cosmical origin of the aurora, and of its dependence on the sun's atmosphere. Mairan did not compare *directly* the equinoxes with the solstices, in

[1] Smithsonian Contributions to Knowledge, VIII. 34.

[2] Annales de l'Observ. Royale de Brux. XI. 42.

[3] Thompson's Meteorology, p. 362. Observ. Magnet. Comm. Nord.

[4] Edinburgh Philosophical Transactions, XIX. Pt. 2.

regard to the frequency of the aurora, although Hansteen[1], Kaemtz[2], and at one time Broun[3], seem to imply that he did; nor would such a comparison have affected the fate of his theory. As early as 1736, Kraft[4] concluded from 141 auroras, observed at St. Petersburg, that the phenomenon occurred more frequently at the equinoxes than at the solstices. Since that time the evidence has accumulated so as to place this conclusion beyond doubt, and to show, also, that the summer minimum is the principal one.[5] The difference between the summer and winter minima is attributable in part to the short nights and long twilights of summer, as contrasted with the long nights and short twilights of winter. But Muncke calculated that the aurora is a little more frequent in winter than in summer, even after allowing for the interference of daylight with the visibility of the phenomenon.[6] On the other hand, if the effect of sunlight in obliterating the aurora is eliminated, the contrast between the maxima of spring and autumn and the minimum of winter will stand out even bolder than it now does.

It is not surprising that some observers, especially in high latitudes, have found the aurora wholly wanting in summer, particularly in June and July.[7] Fortunately for science, an aurora can be *felt*, by its influence on the magnetic needle, even when its presence is invisible. It appears, as might have been expected, that the comparative frequency of the auroras *actually seen* at different seasons of the year varies considerably with the latitude of the observer. I have given for each place, where a series of observations has been made, a table in which the auroras are arranged according to the months of the year; and the aggregates of the different months may also be expressed by a yearly curve. Moreover, all the observations, without regard to geographical locality, have been collected into a similar table, and represented by a similar curve. By comparing the general numbers and curve with the numbers and curve which refer to any particular place on the earth, whatever is local in the phenomenon will manifest itself. In the general curve, the spring maximum occurs in March. But in Dunse, N. Britain, the maximum appears as early as January, while at Utrecht it is as late as May. The summer minimum is found on the general curve in June, while on the yearly curve drawn for some parts of the earth it comes as early as May or as late as August. The autumn maximum stands, on the average of all the observations for the

[1] Mém. de l'Acad. Belgique, XX. 117.

[2] Course of Meteorology, p. 458.

[3] Edinburgh Phil. Trans., XIX. Pt. 2, p. LXXXI.

[4] Comm. Acad. Scient. Imper. Petropol. IX. 340.

[5] Sur la Physique du Globe, par Quetelet, pp. 121–23.

[6] Gehler. Physikalisches Wörterbuch. VII. 148.

[7] Hansteen remarks that the aurora is less frequent at the winter solstice than at the equinoxes, although the winter nights are longer and more favorable for observations. At the summer solstice the twilight is so bright at Christiania that a book may be read at midnight. This light obliterates the fainter light of the aurora; but the presence of the latter is felt in the magnetic disturbances. — Nouv. Mém. de l'Acad. Brux. XX. 117.

whole earth, in October, though the time varies all the way from August to November at different places. The winter minimium is fixed by the whole mass of observations in December, but this also oscillates between November and January according to the locality.

Table XLVII. contains the principal series of observations upon the aurora which have been made in the United States of America, in Canada, and in Greenland; the next contains similar series of observations made in Europe. It will be understood that in both cases the monthly aggregates express *not* the number of auroras, but the number of observations, the same aurora being frequently seen at more than a single place. The monthly maxima and minima in both tables fall upon the same months, with the exception of the autumn maximum, which for the Eastern Continent is in September, and for the Western Continent in October.

In Tables XLIX. and L. the mean epochs of the monthly maxima and minima of the year are arranged in the order of the geographical latitudes, on each continent separately. These tables do not exhibit any connection between the changes in the times of the maxima and minima and the position of the observer. I may add that the limits within which the times of maxima and minima fluctuate, in passing from one station to another on the earth's surface, would be even wider apart than I have placed them, had I not excluded from the discussion special localities, where, from the extreme influence of twilight, the poverty of the observations, the short period of time which they cover, or the unfavorable attitude of the epoch in relation to the secular changes in the phenomenon, the diurnal curve had lost all its ordinary characteristics. These remarks apply to the observations made at St. Martin, Burlington, Boston, Cambridge, Salem, Wilmington, Dunse, and Brussels. The yearly curve for Salem has its principal maximum in July, and two other maxima in March and October; and its lowest minimum in December, with another, less conspicuous, in May and June. Some of the auroras observed at Salem in July are characterized as extraordinary. I have selected, in Table LI., from the auroras seen at New Haven those which belong to the period of time embraced by Dr. Holyoke's observations, and I find in them a principal maximum in July, with other irregularities as great as those noticed in the Salem observations, though not exactly corresponding to them. Of the ninety-seven auroras seen at St. Petersburg in the years 1786 to 1820 inclusive, the maxima fall, as usual, into the months of March and October, and the minima into the months of January and June. Only one aurora was seen in July at St. Petersburg, but thirty were observed in Salem. Dalton's two catalogues of auroras for Kendal, Keswick, and Great Britain refer to places not extremely different in latitude from Salem, and

to nearly the same period of years, but they do not exhibit the anomalies which are so prominent in the Salem curve. The Brussels catalogue shows a large number for July, and is otherwise irregular. A sufficient number of observations was not obtained at Montmorenci and Paris, during the interval of time under consideration, to warrant an argument from them.

The yearly curve for Cambridge is also singular. According to the mean values of all the observations, the ordinary maxima occur in March and September, and the minima in June and December or January. But the number of auroras observed in July is unusually large; and if we take Winthrop's observations, amounting to two hundred and fifty-four auroras, by themselves, the principal maximum is in July, with inferior maxima in March and September, and minima in May and January. The yearly curve for this period, between the years 1742 and 1779 inclusive, resembles the Salem curve, though the latter refers to different years. The number of auroras observed at New Haven between the years 1763 and 1864 is as great for July as for the spring maximum. The observations made at St. Petersburg, between the years 1742 and 1779 inclusive, come to their maxima in April and October, and to their minima in July and January. The whole number of auroras is four hundred and fifty, of which only two were in July; whereas, out of two hundred and fifty-four auroras observed by Winthrop, thirty-one were in July. If we add Wigglesworth's observations to those of Winthrop, so as to extend the period under consideration to the year 1793 inclusive, we shall reach the same general conclusion. A comparison of the Cambridge curve with those of Berlin, Jena, Paris, and Montmorenci, as well as with those of St. Petersburg and Upsal, proves clearly that the differences above indicated cannot be wholly explained by inequalities in the length of daylight and twilight. The yearly curves for Boston, Wilmington, and Brussels are also remarkable, but they are based on scanty observations, and the peculiarities may be only accidental. The Brussels curve, drawn in accordance with the ancient observations, differs considerably from that which would represent Quetelet's observations at the same place. At Hammerfest, Jakobshavn, Gothaab, Fort Reliance, and in Scandinavia the winter minimum and the spring and autumn maxima are almost obliterated by the great changes in the length of day and night in different parts of the year.

In different places the ratio of the maxima and minima numbers varies greatly. In the general table the spring maximum is five per cent. larger than the autumn maximum, and the December minimum is nearly three times larger than the June minimum, and twenty per cent. smaller than the spring maximum. In particular places, where the June minimum is zero, the ratio between maximum and minimum becomes

infinite. The yearly curves indicate the relative changes from month to month, but the absolute values for one place as compared with those found elsewhere do not appear, unless allowance is made for the differences of scale adopted in their construction.

An annual curve, drawn through only twelve points, representing the monthly means, can show simply the *months* in which the maxima and minima occur, but not the days. To see whether the occurrence of the aurora is in any way associated with shooting stars, which appear in unusual abundance on certain days of the year, or with the fall of meteorites, or with any other phenomena, meteorological or cosmical, I have assigned to each day of the year the number of auroras observed upon it, and placed the result in table LII. If these results are projected in a curve, presenting in its Alpine summits and the corresponding valleys the principal maxima and minima in the annual march of auroral displays, there is also seen represented in its uneven flow and its many jagged roughnesses the influence of daylight, of weather, of climate, and of a great variety of accidental disturbances. The principal maxima are reached on March 16 and September 24, and the minima on January 7 and June 23. From a catalogue of about 5500 auroras, compiled by Wolf,[1] he deduces the times of maxima as March 20 and October 15, and the times of minima as June 22 and December 25. These maxima and minima do not appear to stand in any relation to those periods of the year which Biot considers as signalized by displays of meteors, viz., July 25–30, August 7–12, October 24–27, November 13–16.[2]

The observations justify the assumption that the number of auroras at any particular season, or the ordinate of the yearly curve of auroral frequency, is a function of the tropical year. It may, therefore, like any other periodic function, be expressed by a series of terms arranged according to the sines and cosines of the time and its integral multiples. If it is supposed that

t = the time expressed in parts of a year as its unit,
N = the ordinate of the diurnal curve for the time (t),
π = the ratio of the circumference to the diameter of a circle,
x = any integer whatever;

and if S denote the sum of the terms which correspond to the different values of (x), the general form of the equation is

$$1.\quad N = A + S.\ C_x \sin.\ 2\,\pi\,x\,(t + c_x).$$

[1] Vierteljahrsschrift der Naturforsch. Gesellschaft in Zürich, II. 371. [2] Pogg. Ann. der Physik und Chemie, LXVI. 476, 7.

The values of the constants A, C_x and c_x are easily obtained. Let

t = the time of observation counted from January 1, in parts of a year as the unit,
N_t = the number of observed auroras corresponding to this time;

if S = represents the sum of all the values of N which correspond to the different values of t, the following equations will be found:

2. $m\ A = S\ N_t$, in which m represents the number of intervals, that is, the number of months in the year.
3. $m\ C_x \cos\ 2\ \pi\ x\ c_x = 2\ S\ N_t\ \text{sin.}\ 2\ \pi\ x\ t.$
4. $m\ C_x \text{ sin. } 2\ \pi\ x\ c_x = 2\ S\ N_t\ \text{cos.}\ 2\ \pi\ x\ t.$

For,

5. $N = A + S\ C_x \text{ sin. } 2\ \pi\ x\ (t + c_x).$
$= A + S\ (C_x \text{ sin. } 2\ \pi\ x\ t \text{ cos. } 2\ \pi\ x\ c_x + \text{cos. } 2\ \pi\ x\ t \text{ sin. } 2\ \pi\ x\ c_x).$ Hence,
$S\ N_t = m\ A,$

because the sum of the values of sin. $2\ \pi\ x\ t$ and cos. $2\ \pi\ x\ t$, on account of their different signs *plus* or *minus*, equals zero.

Multiplying each side of equation (5) by sin. $2\ \pi\ x\ t$,

6. $N \text{ sin. } 2\ \pi\ x\ t = A \text{ sin. } 2\ \pi\ x\ t + S\ C_x \text{ sin. } (2\ \pi\ x\ t)^2 \text{ cos. } 2\ \pi\ x\ c_x + S\ C_x \text{ sin. } 2\ \pi\ x\ t \text{ cos. } 2\ \pi\ x\ t \text{ sin. } 2\ \pi\ x\ c_x.$

The average value of the first and last terms on the right is zero, since the average value of the sine itself is zero. The second term is always plus, because it is the square of the sine.

$\text{Sin. } 2\ \pi\ x\ t \text{ sin. } 2\ \pi\ x\ t = -\frac{1}{2}\ [\text{cos. } (2\ \pi\ x\ t + 2\ \pi\ x\ t) - \text{cos. } (2\ \pi\ x\ t - 2\ \pi\ x\ t)] = -\frac{1}{2} \text{ cos. } 4\ \pi\ x\ t + \frac{1}{2}.$

The first term $-\frac{1}{2}$ cos. $4\ \pi\ x\ t$ averages zero for all the different values of (t). There remains the factor $\frac{1}{2}$ for each value of t. Hence,

$$3.\ S\ N_t \text{ sin. } 2\ \pi\ x\ t = \frac{m}{2}\ C_x \text{ cos. } 2\ \pi\ x\ c_x.$$

Multiplying each side of equation (5) by cos. $2\ \pi\ x\ t$ and reducing as before,

$$4.\ S\ N_t \text{ cos. } 2\ \pi\ x\ t = \frac{m}{2}\ C_x \text{ sin. } 2\ \pi\ x\ c_x.$$

The values of c_x are found by dividing equation (4) by equation (3).

$$7.\ \text{tang. } 2\ \pi\ x\ c_x = \frac{S\ N_t \text{ cos. } 2\ \pi\ x\ t}{S\ N_t \text{ sin. } 2\ \pi\ x\ t}.$$

$$= \frac{N_0 \cos. 0 + N_1 \cos. x\ 30° + N_2 \cos. x\ 60° + N_3 \cos. x\ 90° + N_4 \cos. x\ 120° \text{ \&c.}}{N_0 \sin. 0 + N_1 \sin. x\ 30° + N_2 \cos. x\ 60° + N_3 \cos. x\ 90° + N_4 \cos. x\ 120° \text{ \&c.}}$$

Multiplying equation (3) by cos. $2\ \pi\ x\ c_x$ and equation (4) by sin. $2\ \pi\ x\ c_x$ and then adding them,

$$8.\ m\ C_x = 2 \cos. 2\ \pi\ x\ c_x\ S\ N_t \sin. 2\ \pi\ x\ t + 2 \sin. 2\ \pi\ x\ c_x\ S\ N_t \cos. 2\ \pi\ x\ t,$$

from which the values of C_x may be obtained.

If the series is supposed to converge so rapidly that the first four terms will give the number of auroras to a sufficiently close approximation, comparable with the accuracy of observation, the general formula becomes

$$9.\ N = A + C_1 \sin. 2\ \pi\ (t + c_1) + C_2 \sin. 4\ \pi\ (t + c_2) + C_3 \sin. 6\ \pi\ (t + c_3).$$

By this general formula I have calculated the mean annual curve (in this case alone carrying the computation to the seventh term), and also the particular curve for those places where a sufficient number of auroras had been observed to encourage such an undertaking. The number of auroras for each month has then been computed by the formula and that number compared with the number actually observed, and from the square of the differences the mean probable error has been obtained by the following formula:

$$10.\ \varepsilon = \ ,674 \sqrt{\frac{S\,\triangle^2}{m-1}}.$$

If we differentiate equation (9), and make the differential equal to zero, we shall have an equation from which the days of maxima and minima of auroral display during the year may be computed.

$$11.\ C_1 \cos. 2\ \pi\ (t + c_1) + 2\ C_2 \cos. 4\ \pi\ (t + c_2) + 3\ C_3 \cos 6\ \pi\ (t + c_3) = 0.$$

The direct calculation of (t) from this equation would be difficult. Knowing from the observations themselves nearly at what times these maxima and minima occur, by substituting empirical values for (t) we arrive by this tentative process to the required result: viz., the precise times and the values of the maxima and minima. In all the preceding computations, whatever the number of auroras actually observed in the different months, they have been reduced to what they would have been if exactly one hundred auroras had been seen during the year, so that in each curve the value of A is 8.33+.

FORMULÆ FOR THE MEAN ANNUAL CURVE, AT DIFFERENT PLACES.

Jakobshavn,	$N = 8.33 + 10.40 \sin.[2\pi t + 123°\ 2'] + 1.13 \sin.[4\pi t + 206°\ 7'] + 1.41 \sin.[6\pi t + 333°\ 24']$.
Gothaab,	$N = 8.33 + 8.21 \sin.[2\pi t + 110°\ 48'] + 1.54 \sin.[4\pi t + 316°\ 6'] + .64 \sin.[6\pi t + 335°\ 10']$.
Newf'd,	$N = 8.33 + .33 \sin.[2\pi t + 60°\ 17'] + 3.32 \sin.[4\pi t + 336°\ 25'] + .71 \sin.[6\pi t + 38°\ 37']$.
Quebec,	$N = 8.33 + .45 \sin.[2\pi t + 57°\ 40'] + 3.72 \sin.[4\pi t + 315°\ 22'] + 1.68 \sin.[6\pi t + 331°\ 57']$.
Toronto,	$N = 8.33 + .18 \sin.[2\pi t + 12°\ 8'] + 2.13 \sin.[4\pi t + 259°\ 57'] + .52 \sin.[6\pi t + 304°\ 51']$.
Newberry,	$N = 8.33 + 3.52 \sin.[2\pi t + 88°\ 42'] + 6.16 \sin.[4\pi t + 326°\ 57'] + 1.96 \sin.[6\pi t + 51°\ 19']$.
Salem,	$N = 8.33 + 2.76 \sin.[2\pi t + 264°\ 47'] + 1.54 \sin.[4\pi t + 340°\ 57'] + 1.47 \sin.[6\pi t + 300°\ 55']$.
Providence,	$N = 8.33 + .62 \sin.[2\pi t + 127°\ 44'] + 3.07 \sin.[4\pi t + 300°\ 0'] + 2.83 \sin.[6\pi t + 35°\ 59']$.
Cambridge,	$N = 8.33 + 1.02 \sin.[2\pi t + 261°\ 54'] + 2.84 \sin.[4\pi t + 339°\ 9'] + 1.28 \sin.[6\pi t + 252°\ 52']$.
Worcester,	$N = 8.33 + .72 \sin.[2\pi t + 150°\ 11'] + 3.86 \sin.[4\pi t + 320°\ 52'] + .95 \sin.[6\pi t + 155°\ 34']$.
N. Haven,	$N = 8.33 + .99 \sin.[2\pi t + 182°\ 59'] + 1.02 \sin.[4\pi t + 312°\ 45'] + .57 \sin.[6\pi t + 196°\ 42']$.
N. York,	$N = 8.33 + 1.34 \sin.[2\pi t + 264°\ 2'] + 2.29 \sin.[4\pi t + 324°\ 51'] + .54 \sin.[6\pi t + 157°\ 11']$.
Abo,[1]	$N = 8.33 + 5.40 \sin.[2\pi t + 114°\ 41'] + 4.97 \sin.[4\pi t + 315°\ 42'] + .83 \sin.[6\pi t + 356°\ 36']$.
Spydberg,	$N = 8.33 + 5.28 \sin.[2\pi t + 111°\ 28'] + 6.61 \sin.[4\pi t + 304°\ 27'] + 2.55 \sin.[6\pi t + 345°\ 56']$.
Hammerfest,	$N = 8.33 + 11.52 \sin.[2\pi t + 109°\ 24'] + 2.71 \sin.[4\pi t + 114°\ 11'] + 1.11 \sin.[6\pi t + 350°\ 37']$.
Christiania,	$N = 8.33 + 4.83 \sin.[2\pi t + 115°\ 41'] + 4.99 \sin.[4\pi t + 317°\ 28'] + .76 \sin.[6\pi t + 189°\ 28']$.
Stockholm,	$N = 8.33 + 3.68 \sin.[2\pi t + 90°\ 48'] + 5.80 \sin.[4\pi t + 303°\ 9'] + 1.31 \sin.[6\pi t + 180°\ 9']$.
St.Petersb'g,	$N = 8.33 + 2.81 \sin.[2\pi t + 95°\ 52'] + 5.99 \sin.[4\pi t + 308°\ 42'] + .57 \sin.[6\pi t + 208°\ 24']$.
Upsal,	$N = 8.33 + 5.41 \sin.[2\pi t + 119°\ 6'] + 4.57 \sin.[4\pi t + 321°\ 58'] + .86 \sin.[6\pi t + 296°\ 7']$.
Dunse,	$N = 8.33 + 6.30 \sin.[2\pi t + 140°\ 37'] + 3.43 \sin.[4\pi t + 313°\ 35'] + 2.03 \sin.[6\pi t + 91°\ 56']$.
Makerstoun,	$N = 8.33 + 5.79 \sin.[2\pi t + 102°\ 2'] + 4.47 \sin.[4\pi t + 310°\ 30'] + 2.00 \sin.[6\pi t + 341°\ 35']$.
G. Britain,	$N = 8.33 + 3.87 \sin.[2\pi t + 125°\ 49'] + 4.24 \sin.[4\pi t + 286°\ 57'] + .40 \sin.[6\pi t + 73°\ 20']$.
Berlin,	$N = 8.33 + 3.91 \sin.[2\pi t + 48°\ 17'] + 5.44 \sin.[4\pi t + 288°\ 36'] + .59 \sin.[6\pi t + 305°\ 17']$.
Utrecht, &c.	$N = 8.33 + 2.29 \sin.[2\pi t + 351°\ 7'] + 3.64 \sin.[4\pi t + 281°\ 18'] + 1.38 \sin.[6\pi t + 131°\ 6']$.
Franeker,	$N = 8.33 + 1.65 \sin.[2\pi t + 87°\ 10'] + 4.86 \sin.[4\pi t + 311°\ 57'] + .30 \sin.[6\pi t + 103°\ 58']$.
Jena,	$N = 8.33 + 2.09 \sin.[2\pi t + 189°\ 8'] + 5.01 \sin.[4\pi t + 305°\ 40'] + 1.26 \sin.[6\pi t + 71°\ 35']$.
Mannheim,	$N = 8.33 + 1.17 \sin.[2\pi t + 33°\ 2'] + 4.29 \sin.[4\pi t + 310°\ 52'] + 1.55 \sin.[6\pi t + 185°\ 44']$.
Sagan,	$N = 8.33 + 3.91 \sin.[2\pi t + 101°\ 49'] + 5.69 \sin.[4\pi t + 284°\ 4'] + 1.03 \sin.[6\pi t + 241°\ 41']$.
Brussels,	$N = 8.33 + 2.53 \sin.[2\pi t + 312°\ 57'] + 2.77 \sin.[4\pi t + 217°\ 47'] + .98 \sin.[6\pi t + 36°\ 1']$.
Plymouth,	$N = 8.33 + 2.09 \sin.[2\pi t + 98°\ 33'] + 4.10 \sin.[4\pi t + 303°\ 55'] + 2.90 \sin.[7\pi t + 253°\ 16']$.
Carlsruhe,	$N = 8.33 + 2.73 \sin.[2\pi t + 352°\ 28'] + 5.11 \sin.[4\pi t + 312°\ 59'] + 2.34 \sin.[6\pi t + 214°\ 59']$.
Paris,	$N = 8.33 + 2.09 \sin.[2\pi t + 249°\ 47'] + 3.47 \sin.[4\pi t + 272°\ 12'] + 1.46 \sin.[6\pi t + 71°\ 29']$.
Mt'morenci,	$N = 8.33 + .24 \sin.[2\pi t + 300°\ 5'] + 5.49 \sin.[4\pi t + 309°\ 54'] + .58 \sin.[6\pi t + 30°\ 48']$.
Wittemberg,	$N = 8.33 + 3.28 \sin.[2\pi t + 119°\ 46'] + 5.32 \sin.[4\pi t + 333°\ 25'] + .76 \sin.[6\pi t + 345°\ 52']$.
Italy,	$N = 8.33 + 1.97 \sin.[2\pi t + 63°\ 37'] + 4.85 \sin.[4\pi t + 335°\ 48'] + 3.24 \sin.[6\pi t + 290°\ 35']$.
Gen. Curve,	$N = 8.33 + 3.03 \sin.[2\pi t + 109°\ 52'] + 2.53 \sin.[4\pi t + 309°\ 5'] + .16 \sin.[6\pi t + 213°\ 31'] + .56 \sin.[8\pi t + 162°\ 45'] + .27 \sin.[10\pi t + 32°\ 38']$.

[1] This agrees exactly with the formula computed by Hällstrom. Acta Soc. Sci. Fennicæ, II. 369.

As the ancient astronomers, by the matchless device of cycles and epicycles, were able to explain numerous irregularities in the apparent motions of the heavenly bodies, even when referred to the earth as the centre of motion, it is evident that the general formula above explained, when expanded into a sufficient number of terms, will accomplish what the theory of cycles and epicycles has accomplished, since it is only the algebraical embodiment of that geometrical conception. We draw a line parallel to the zero line, and at a distance from it represented by A, the length of it corresponding to one year. On this average line slides the axis of a circle, having a radius C_1 and turning on its axis once a year. A point in the circumference of this circle draws the curve which results from the two motions, $2\pi c_1$ being the angular distance of this point from the direction of the average line on January 15. On the circumference of this circle rests the axis of another, with a radius of C_2, the value of $4\pi c_2$ expressing the position for January 15 of the point on its circumference which describes the resultant curve. This circle turns on its axis twice a year. On the circumference of this circle rests the axis of another circle, which turns round three times in a year. C_3 and $6\pi c_3$ have a similar meaning to that ascribed to the corresponding constants of the other terms.

Generally, the most conspicuous characteristics of the annual curve are indicated by the values of the constants C_2 and $4\pi c_2$. Compared with C_1 or C_3, the value of C_2 is large and the angle $4\pi c_2$ is such as to bring the maxima into spring and autumn and the minima into summer and winter. By comparing the values of C_2 and $4\pi c_2$ in the curves of different places, it will be seen whether there is any dependence in the times and the degrees of the semi-annual fluctuations on geographical position. If, at the same place, there is any change in the law of this fluctuation from century to century, it will appear by comparing the values of C_2 and $4\pi c_2$, when computed from different series of observations made at the same place in different centuries. From the magnitude of C_1, especially when $2\pi c_1$ approximates to the value of 100°, the influence of longer and shorter daylight in summer and winter is discovered. This influence grows to such importance in very high latitudes that C_1 surpasses C_2, and the value of $2\pi c_1$ governs the times of maxima and minima. The increase of C_1 does not, however, progress so uniformly with increase of latitude as to warrant the inference that the second term of the formula is expressive of nothing else than the influence of daylight. Superadded to the semi-annual periodicity of the aurora, there is an annual periodicity exclusive of that annual change introduced by the seasons. The fourth term of the formula may originate in imperfect or insufficient series of observations. A periodicity of four months is improbable in itself, and the co-efficient $6\pi c_3$ is generally small, particularly in the mean curve, where the number of observations massed together is so large as to mask small disturbing influences.

JAKOBSHAVN. $\epsilon = .78$				GOTHAAB. $\epsilon = 1.18$				NEWFOUNDLAND. $\epsilon = 1.31$			
Observed.	Computed.	Δ	Δ^2	Observed.	Computed.	Δ	Δ^2	Observed.	Computed.	Δ	Δ^2
14.59	15.92	— 1.33	1.7689	14.19	14.66	— .47	.2209	5.96	7.73	— 1.77	3.1329
12.97	13.18	— .21	.0441	13.95	14.56	— .61	.3721	13.25	11.18	+ 2.07	2.2849
9.19	7.78	+ 1.41	1.9881	11.63	11.42	+ .21	.0441	9.27	11.47	— 2.20	4.8400
.54	1.90	— 1.36	1.8496	4.88	5.87	— .99	.9801	10.60	9.27	+ 1.33	1.7689
0	— .44	+ .44	.1936	0	1.26	— 1.26	1.5876	7.28	6.81	+ .47	.2209
0	— .16	+ .16	.0256	0	— .65	+ .65	.4225	3.31	5.42	— 2.11	4.4521
0	— .25	+ .25	.0625	0	— .12	+ .12	.0144	8.60	6.28	+ 2.32	5.3824
0	1.23	— 1.23	1.5129	1.16	2.95	— 1.79	3.2041	8.60	9.42	— .82	0.6724
9.19	7.62	+ 1.57	2.4649	12.33	8.23	+ 4.10	16.8100	10.60	11.79	— 1.19	1.4161
15.14	15.76	— .62	.3844	10.47	12.93	— 2.46	6.0516	12.59	10.05	+ 2.54	6.4516
18.38	19.36	— .98	.9604	16.51	14.55	+ 1.96	3.8416	3.31	5.92	— 2.61	6.8121
20.00	18.09	— 1.91	3.6481	14.88	14.33	+ .55	.3025	6.62	4.64	+ 1.98	3.9204
100.00	99.99		14.9031	100.00	99.99		33.8515	99.99	99.98		39.6247

QUEBEC. $\epsilon = 1.60$				TORONTO. $\epsilon = .76$				NEWBERRY. $\epsilon = 1.10$			
Observed.	Computed.	Δ	Δ^2	Observed.	Computed.	Δ	Δ^2	Observed.	Computed.	Δ	Δ^2
3.55	5.31	— 1.76	3.0976	5.40	5.92	— .52	.2704	10.55	10.02	+ .53	.2809
14.79	11.25	+ 3.54	12.5316	9.51	7.61	+ 1.90	3.6100	15.61	15.44	+ .17	.0289
8.28	13.12	— 4.84	23.4256	8.74	9.99	— 1.25	1.5625	12.84	14.78	— 1.94	3.7636
14.20	11.88	+ 2.32	5.3824	11.83	10.65	+ 1.18	1.3924	13.76	10.54	+ 3.22	10.3684
4.14	6.58	— 2.44	5.9536	9.00	9.67	— .67	.4489	2.75	5.38	— 2.63	6.9169
5.92	6.00	— .08	.0064	6.17	8.07	— 1.90	3.6100	.92	.40	+ .52	.2704
7.69	6.12	+ 1.57	2.4649	7.97	6.55	+ 1.42	2.0164	1.38	— .07	+ 1.45	2.1025
5.92	7.39	— 1.47	2.1609	6.43	6.31	+ .12	.0144	5.05	6.81	— 1.76	3.0976
11.24	10.74	+ .50	.2500	8.48	8.13	+ .35	.1225	14.68	14.18	+ .50	.2500
12.43	10.01	+ 2.42	5.8564	11.05	10.21	+ .84	.7056	13.76	12.83	+ .93	.8649
7.69	8.12	— .43	.1849	8.74	9.74	— 1.00	1.0000	4.59	5.70	— 1.11	1.2321
4.14	3.46	+ .68	.4624	6.68	7.15	— .47	.2209	4.14	3.97	+ .17	.0289
99.99	99.98		61.7767	100.00	100.00		14.9740	100.03	99.98		29.2051

SALEM. $\epsilon = 1.06$				PROVIDENCE. $\epsilon = 1.15$				CAMBRIDGE. $\epsilon = .89$			
Observed.	Computed.	Δ	Δ^2	Observed.	Computed.	Δ	Δ^2	Observed.	Computed.	Δ	Δ^2
4.54	3.82	+ .62	.3844	9.37	7.83	+ 1.54	2.3716	5.10	5.09	+ .01	.0001
7.07	7.59	— .52	.2704	10.63	10.86	— .23	.0529	8.22	8.80	— .58	.3364
9.09	9.52	— .43	.1849	8.75	9.25	— .50	.2500	11.76	11.73	+ .03	.0009
8.59	7.83	+ .76	.5929	8.12	8.32	— .20	.0400	10.20	9.58	+ .62	.3844
7.58	7.22	+ .36	.1296	11.25	9.43	+ 1.82	3.3124	6.37	5.70	+ .67	.4489
7.58	9.83	— 2.25	5.0625	4.37	7.36	— 2.99	8.9401	5.10	5.95	— .85	.7225
15.15	11.84	+ 3.31	10.9561	6.25	3.52	+ 2.73	7.4529	10.34	9.55	+ .79	.6241
8.59	11.10	— 2.51	6.3001	4.37	5.80	— 1.43	2.0449	8.50	11.45	— 2.95	8.7025
10.61	10.18	+ .43	.1849	13.13	11.74	+ .39	.1521	13.31	10.54	+ 2.77	7.6729
11.10	9.85	+ 1.25	1.5625	13.13	13.67	— .54	.2916	9.21	9.11	+ .10	.0100
6.06	7.43	— 1.37	1.8769	8.75	7.23	+ 1.52	2.3104	6.80	7.38	— .58	.3364
4.04	3.81	+ .23	.0529	1.87	3.98	— 2.11	4.4521	5.10	5.10	.00	.0000
100.00	100.02		27.5581	99.99	99.99		31.6710	100.01	99.98		19.2391

WORCESTER. $\varepsilon = 1.02$				NEW HAVEN. .78				NEW YORK STATE. $\varepsilon = .36$			
Observed.	Computed.	Δ	Δ²	Observed.	Computed	Δ	Δ²	Observed.	Computed.	Δ	Δ²
8.96	6.65	+ 2.31	5.3361	7.75	7.37	+ .38	.1444	6.31	5.89	+ .42	.1764
6.13	8.84	— 2.71	7.3441	7.26	7.47	— .21	.0441	7.39	7.57	— .18	.0324
12.74	11.39	+ 1.35	1.8225	8.86	8.59	+ .27	.0729	9.13	9.62	— .49	.2401
11.79	11.01	+ .78	.6084	8.24	8.64	— .40	.1600	10.95	10.01	+ .94	.8836
4.72	6.63	— 1.91	3.6481	7.63	7.11	+ .52	.2704	7.39	8.12	— .73	.5329
4.24	3.03	+ 1.21	1.4641	5.66	6.36	— .70	.4900	6.64	6.64	.00	.0000
5.66	5.14	+ .52	.2704	8.86	7.80	+ 1.06	1.1236	8.80	8.14	+ .66	.4356
8.96	10.57	— 1.61	2.5921	8.11	9.64	— 1.53	2.3409	10.37	11.02	— .65	.4225
14.15	12.90	+ 1.25	1.5625	11.93	10.02	+ 1.91	3.6481	11.70	11.61	+ .09	.0081
10.38	10.53	— .15	.0225	7.63	9.52	— 1.89	3.5721	9.71	9.29	+ .42	.1764
7.07	7.28	— .21	.0441	10.58	9.10	+ 1.48	2.1904	6.22	6.62	— .40	.1600
5.19	6.01	— .82	.6724	7.50	8.35	— .85	.7225	5.39	5.46	— .07	.0049
99.99	99.98		25.3873	100.01	99.97		14.7794	100.00	99.99		3.0729

ABO. $\varepsilon = .69$				SPYDBERG. $\varepsilon = 2.31$				HAMMERFEST. $\varepsilon = .40$			
Observed.	Computed.	Δ	Δ²	Observed.	Computed.	Δ	Δ²	Observed.	Computed.	Δ	Δ²
9.68	9.72	— .04	.0016	9.88	7.18	+ 2.70	7.2900	20.88	21.49	— .61	.3721
12.76	13.63	— .87	.7569	8.64	14.60	— 5.96	35.5216	17.58	17.20	+ .38	.1444
14.52	13.70	+ .82	.6724	20.99	15.70	+ 5.29	27.9841	8.79	8.44	+ .35	.1225
8.94	8.72	+ .22	.0484	7.41	9.38	— 1.97	3.8809	0	.94	— .94	.8836
1.32	2.53	— 1.21	1.4641	2.47	3.07	— .60	.3600	0	— .87	+ .87	.7569
0	—1.03	+ 1.03	1.0609	0	— .38	+ .38	.1444	0	.31	— .31	.0961
.29	.00	+ .29	.0841	0	—1.41	+ 1.41	1.9881	0	.12	— .12	.0144
4.11	5.73	— 1.62	2.6244	1.23	3.09	— 1.86	3.4596	0	.01	— .01	.0001
14.37	12.60	+ 1.77	3.1329	12.34	12.89	— .55	.3025	4.40	3.84	+ .56	.3136
14.22	14.89	+ .67	.4489	22.22	18.18	+ 4.04	16.3216	9.89	10.78	— .89	.7921
10.85	11.44	— .59	.3481	7.41	12.57	— 5.16	26.6256	17.58	16.98	+ .60	.3600
8.94	8.06	+ .88	.7744	7.41	5.12	+ 2.29	5.2441	20.88	20.75	+ .13	.0169
100.00	99.99		11.4171	100.00	100.00		129.1225	100.00	99.99		3.8727

CHRISTIANIA. $\varepsilon = .88$				STOCKHOLM. $\varepsilon = .80$				ST. PETERSBURG. $\varepsilon = .95$			
Observed.	Computed.	Δ	Δ²	Observed.	Computed.	Δ	Δ²	Observed.	Computed.	Δ	Δ²
8.61	9.30	— .69	.4761	7.92	7.15	+ .77	.5929	6.54	6.15	+ .39	.1521
11.42	11.80	— .38	.1444	9.99	10.50	— .51	.2601	9.12	11.01	— 1.89	3.5721
14.04	13.58	+ .46	.2116	14.66	15.31	— .65	.4225	16.76	15.36	+ 1.40	1.9600
11.24	10.36	+ .88	.7744	16.42	14.45	+ 1.97	3.8809	13.81	13.22	+ .59	.3481
.56	2.83	— 2.27	5.1529	3.81	6.13	— 2.32	5.3824	3.50	5.49	— 1.99	3.9601
0	—2.10	+ 2.10	4.4100	0	—1.36	+ 1.36	1.8496	1.20	— .31	+ 1.51	2.2801
.19	.62	— .43	.1849	0	— .20	+ .20	.0400	1.38	1.16	+ .22	.0484
6.55	7.86	— 1.31	1.7161	5.57	6.80	— 1.23	1.5129	5.89	7.46	— 1.57	2.4649
14.61	12.83	+ 1.78	3.1684	12.90	11.71	+ 1.19	1.4161	13.81	12.47	+ 1.34	1.7956
12.17	13.05	— .88	.7744	11.44	11.92	— .48	.2304	13.08	12.80	+ .28	.0784
10.30	10.84	— .54	.2916	9.99	9.90	+ .09	.0081	7.64	9.37	— 1.73	2.9929
10.30	9.03	+ 1.27	1.6129	7.33	7.68	— .35	.1225	7.27	5.81	+ 1.46	2.1316
100.00	100.00		18.9177	100.03	99.99		15.7184	100.00	99.99		21.7843

UPSAL. $\varepsilon = .72$				DUNSE. $\varepsilon = 1.11$				MAKERSTOUN. $\varepsilon = .73$			
Observed.	Computed.	Δ.	Δ²	Observed.	Computed.	Δ	Δ²	Observed.	Computed.	Δ	Δ²
8.35	9.47	— 1.12	1.2544	13.87	11.85	+ 2.02	4.0804	11.96	9.96	+ 2.00	4.0000
12.87	13.20	— .43	.1849	8.40	10.10	— 1.70	2.8900	14.13	14.96	— 1.26	1.5876
14.93	13.71	+ 1.22	1.4884	7.56	7.37	+ .19	.0361	15.22	14.96	+ .26	.0676
7.37	8.14	— .77	.5929	7.56	6.02	+ 1.54	2.3716	8.70	8.62	+ .08	.0064
.69	1.21	— .52	.2704	1.26	3.34	— 2.08	4.3264	3.26	3.01	+ .25	.0625
.20	— 1.22	+ 1.44	2.0736	0	— .92	+ .92	0.8464	0	.52	— .52	.2704
.39	1.56	— 1.17	1.3689	.84	— .18	+ 1.02	1.0404	0	— .09	+ .09	.0081
7.07	6.89	+ .18	0.0324	5.88	8.18	— 2.30	5.2900	3.80	2.95	+ .85	.7225
12.38	12.00	— .38	.1444	18.07	15.87	+ 2.20	4.8400	8.70	10.13	— 1.43	2.0449
14.34	14.16	+ .18	.0324	14.29	15.62	— 1.33	1.7689	15.76	14.84	+ .92	0.8464
10.71	12.03	— 1.32	1.7424	12.60	11.71	+ .89	.7921	12.50	12.02	+ .48	.2304
10.71	8.84	+ 1.87	3.4969	9.66	11.01	— 1.35	1.8225	5.98	7.72	— 1.74	3.0276
100.01	99.99		12.6820	100.00	99.97		30.1048	101.01	100.12		12.8744

G. BRITAIN. $\varepsilon = .61$				BERLIN. $\varepsilon = 1.04$				UTRECHT, &c. $\varepsilon = .84$			
Observed.	Computed.	Δ	Δ²	Observed.	Computed.	Δ	Δ²	Observed.	Computed.	Δ	Δ²
8.96	7.80	+ 1.16	1.3456	7.04	5.61	+ 1.43	2.0449	6.53	5.45	+ 1.08	1.1664
8.51	9.07	— .56	.3136	10.85	11.43	— .58	.3364	6.27	7.08	— .81	.6561
11.26	10.65	+ .61	.3721	16.42	16.61	— .19	.0361	12.27	11.48	+ .79	.6241
10.11	10.01	+ .10	.0100	15.54	15.75	— .21	.0441	13.73	15.07	— 1.34	1.7956
5.52	6.14	— .62	.3844	11.44	9.72	+ 1.72	2.9584	14.67	12.68	+ 1.99	3.9601
1.61	1.50	+ .11	.0121	.59	3.37	— 2.78	7.7284	4.53	6.46	— 1.93	3.7249
.69	.75	— .06	.0036	2.93	0.74	+ 2.19	4.7961	4.93	4.08	+ .85	.7225
5.52	5.68	— .16	.0256	2.93	3.08	— .15	.0225	7.87	7.25	+ .62	.3844
13.33	12.21	+ 1.12	1.2544	6.45	8.22	— 1.77	3.1329	8.53	9.99	— 1.46	2.1316
13.56	14.77	— 1.21	1.4641	13.20	11.23	+ 1.97	3.8809	9.87	8.73	+ 1.14	1.2996
13.56	12.43	+ 1.13	1.2769	8.50	9.09	— .59	.3481	6.27	6.32	— .05	.0025
7.35	8.97	— 1.62	2.6244	4.11	5.13	— 1.02	1.0404	4.53	5.40	— .87	.7569
99.98	99.98		9.0868	100.00	99.98		26.3692	100.00	99.99		17.2247

FRANEKER. $\varepsilon = 1.50$				JENA. $\varepsilon = 1.91$				MANNHEIM. $\varepsilon = 1.23$			
Observed.	Computed.	Δ	Δ²	Observed.	Computed.	Δ	Δ²	Observed.	Computed.	Δ	Δ²
8.65	6.66	+ 1.99	3.9601	2.38	5.12	— 2.74	7.5076	8.33	5.57	+ 2.76	7.6176
6.49	10.74	— 4.25	18.0625	10.71	7.90	+ 2.81	7.8961	5.55	8.64	— 3.09	9.5481
17.75	13.56	+ 4.19	17.5561	4.76	10.73	— 5.97	35.6409	15.28	13.71	+ 1.57	2.4649
9.96	12.10	— 2.14	4.5796	11.91	9.94	+ 1.97	3.8809	14.81	14.10	+ .71	.5041
6.93	6.86	+ .07	.0049	4.76	7.41	— 2.65	7.0225	6.02	7.90	— 1.88	3.5344
2.60	2.26	+ .34	.1156	2.38	3.42	— 1.04	1.0816	3.70	2.68	+ 1.02	1.0404
3.46	2.78	+ .68	.4624	4.76	3.40	+ 1.36	1.8496	5.55	4.62	+ .93	.8649
6.49	7.94	— 1.45	2.1025	9.52	9.75	— .23	.0529	7.41	9.64	— 2.23	4.9729
12.99	12.33	+ .66	.4356	16.67	15.07	+ 1.60	2.5600	12.96	11.05	+ 1.91	3.6481
12.99	11.79	+ 1.20	1.4400	17.86	14.07	+ 3.79	14.3641	8.33	9.05	— .72	.5184
5.63	7.79	— 2.16	4.6656	7.14	8.27	— 1.13	1.2769	7.41	7.15	+ .26	.0676
6.06	5.17	+ .89	.7921	7.14	4.91	+ 2.23	4.9729	4.63	5.89	— 1.26	1.5876
100.00	99.98		54.1770	99.99	99.99		88.1060	99.98	100.00		36.3700

SAGAN. $\varepsilon = 1.69$				BRUSSELS. $\varepsilon = .69$				PLYMOUTH. $\varepsilon = 1.36$			
Observed.	Computed.	Δ	Δ^2	Observed.	Computed.	Δ	Δ^2	Observed.	Computed.	Δ	Δ^2
10.42	5.73	+ 4.69	21.9961	5.19	5.34	— .15	.0225	6.67	4.22	+ 2.45	6.0025
5.83	9.20	— 3.37	11.3569	5.63	5.66	— .03	.0009	5.83	9.41	— 3.58	12.8164
14.17	14.41	— .24	.0576	7.79	7.30	+ .49	.2401	19.17	15.55	+ 3.62	13.1044
16.67	13.54	+ 3.13	9.7969	9.52	10.94	— 1.42	2.0164	10.00	12.26	— 2.26	5.1076
3.33	6.39	— 3.06	9.3636	16.45	14.05	+ 2.40	5.7600	5.00	3.98	+ 1.02	1.0404
.83	.17	+ .66	.4356	9.56	12.66	— 3.10	9.6100	.83	1.87	— 1.04	1.0816
1.25	— .11	+ 1.36	1.8496	9.56	7.93	+ 1.63	2.6569	6.67	5.64	+ 1.03	1.0609
3.33	4.34	— 1.01	1.0201	4.76	5.52	— .76	.5776	6.67	7.82	— 1.15	1.3225
9.17	10.17	— 1.00	1.0000	6.93	7.28	— .35	.1225	8.33	8.47	— .14	.0196
16.25	14.17	+ 2.08	4.3264	9.96	9.12	+ .84	.7056	12.50	11.21	+ 1.29	1.6641
12.92	13.41	— .49	.2401	7.36	8.10	— .74	.5476	10.83	12.13	— 1.30	1.6900
5.83	8.59	— 2.76	7.6176	6.49	6.10	+ .39	.1521	7.50	7.43	+ .07	.0049
100.00	100.01		69.0605	100.00	100.00		22.4122	100.00	99.99		44.9149

CARLSRUHE. $\varepsilon = 1.02$				PARIS. $\varepsilon = 2.42$				MONTMORENCI. $\varepsilon = 1.02$			
Observed.	Computed.	Δ	Δ^2	Observed.	Computed.	Δ	Δ^2	Observed.	Computed.	Δ	Δ^2
2.30	2.89	— .59	.3481	3.70	4.29	— .59	.3481	4.76	4.21	+ .55	.3025
10.34	8.61	+ 1.73	2.9929	4.63	5.12	— .49	.2401	7.74	9.65	— 1.91	3.6481
14.94	16.73	— 1.79	3.2041	11.11	7.19	+ 3.92	15.3664	15.48	13.19	+ 2.29	5.2441
17.24	16.69	+ .55	.3025	3.70	10.61	— 6.91	47.7481	10.71	12.17	— 1.46	2.1316
9.20	8.37	+ .83	.6889	18.52	11.69	+ 6.83	46.6489	8.33	7.89	+ .44	.1936
2.30	3.19	— .89	.7921	4.63	8.28	— 3.65	13.3225	3.57	3.91	— .34	.1156
5.75	6.29	— .54	.2916	5.56	5.45	+ .11	.0121	5.36	4.03	+ 1.33	1.7689
12.64	10.35	+ 2.29	5.2441	9.26	8.31	+ .95	.9025	6.55	8.90	— 2.35	5.5225
6.90	9.71	— 2.81	7.8961	13.89	13.17	+ .72	.5184	16.07	13.78	+ 2.29	5.2441
9.20	7.45	+ 1.75	3.0625	10.19	12.98	— 2.79	7.7841	11.90	12.92	— 1.01	1.0201
5.75	6.00	— .25	.0625	11.11	8.22	+ 2.89	8.3521	6.55	6.88	— .33	.1089
3.45	3.70	— .25	.0625	3.70	4.68	— .98	.9604	2.98	2.44	+ .54	.2916
100.01	99.98		24.9479	100.00	100.00		142.2037	100.00	99.97		25.5916

WITTEMBERG. $\varepsilon = 1.64$				ITALY. $\varepsilon = 2.34$				MEAN CURVE. $\varepsilon = .30$			
Observed.	Computed.	Δ	Δ^2	Observed.	Computed.	Δ	Δ^2	Observed.	Computed.	Δ	Δ^2
8.79	8.61	+ .18	.0324	4.54	5.08	— .54	.2916	9.54	9.13	+ .41	.1681
13.19	13.65	— .46	.2116	10.23	14.27	— 4.04	16.3216	9.73	10.55	— .82	.6724
14.29	13.84	+ .45	.2025	23.86	17.83	+ 6.03	36.3609	11.96	11.32	+ .64	.4096
7.69	8.35	— .66	.4356	5.68	10.06	— 4.38	19.1844	9.37	9.40	— .03	.0009
3.30	2.38	+ .92	.8464	3.41	2.34	+ 1.07	1.1449	5.09	5.53	— .44	.1936
0	.48	— .48	.2304	4.54	3.56	+ .98	.9604	3.22	2.86	+ .36	.1296
2.20	3.29	— 1.09	1.1881	6.82	7.61	— .79	.6241	3.72	3.61	+ .11	.0121
12.09	8.87	+ 3.22	10.3684	7.95	8.06	— .11	.0121	6.45	6.91	— .46	.2116
8.79	13.44	— 4.65	21.6225	7.95	8.48	— .53	.2809	10.39	10.08	+ .31	.0961
17.59	13.08	+ 4.51	20.3401	13.64	10.58	+ 3.06	9.3636	11.37	11.20	+ .17	.0289
5.50	8.42	— 2.92	8.5264	3.41	8.65	— 5.24	27.4576	9.87	10.34	— .47	.2209
6.59	5.56	+ 1.03	1.0609	7.95	3.46	+ 4.49	20.1601	9.29	9.08	+ .21	.0441
100.02	99.97		65.0653	99.98	99.98		132.1622	100.00	100.01		2.1879

In 1843 Eklöf[1] published at Helsingfors, Russia, a mathematical discussion of the annual changes of the auroral phenomena, making use of the same periodic function as I have adopted.[2]

$$P_m = 8.33 + u' \sin.(m\,30° + U') + u'' \sin.(m\,60° + U'') + u''' \sin.(m\,90° + U''').$$

He also has reduced all the observations to the uniform standard of one hundred for the twelve months of the year. As in his formula (m) is equal to zero for January 1, the time counts from January 1, whereas I take January 15 as the initial day of the year. Accordingly my values of c_x exceed by 15° and multiples of 15° the values of U^x computed by Eklöf. This should be remembered in comparing his formulas with those which I have computed for the same places. There is an advantage in this comparison, inasmuch as the observations which he used generally refer to a different period of years from that which I included in my calculations. For this purpose I append his conclusions.

Berlin, $P_m = 8.33 + 3.46 \sin.(m\,30° + 110°\,22') + 6.97 \sin.(m\,60° + 265°\,27') + 3.37 \sin.(m\,90° + 277°\,35')$.

London, $P_m = 8.33 + 5.66 \sin.(m\,30° + 121°\,32') + 5.33 \sin.(m\,60° + 257°\,55') + 1.57 \sin.(m\,90° + 243°\,26')$.

Upsal, $P_m = 8.33 + 5.42 \sin.(m\,30° + 101°\,48') + 3.94 \sin.(m\,60° + 283°\,24') + 0.94 \sin.(m\,90° + 281°\,22')$.

St.Petersb'g, $P_m = 8.33 + 3.99 \sin.(m\,30° + 129°\,41') + 7.77 \sin.(m\,60° + 278°\,28') + 1.17 \sin.(m\,90° + 272°\,30')$.

Italy, $P_m = 8.33 + 1.97 \sin.(m\,30° + 48°\,38') + 4.85 \sin.(m\,60° + 305°\,49') + 3.24 \sin.(m\,90° + 245°\,37')$.

Utrecht, $P_m = 8.33 + 2.29 \sin.(m\,30° + 336°\,8') + 3.64 \sin.(m\,60° + 251°\,16') + 1.40 \sin.(m\,90° + 86°\,34')$.

Carlsruhe, $P_m = 8.33 + 2.73 \sin.(m\,30° + 337°\,28') + 5.11 \sin.(m\,60° + 282°\,59') + 2.34 \sin.(m\,90° + 170°\,0')$.

Mt'morenci, $P_m = 8.33 + 1.21 \sin.(m\,30° + 71°\,44') + 4.07 \sin.(m\,60° + 279°\,46') + 0.71 \sin.(m\,90° + 14°\,4')$.

Wittemberg, $P_m = 8.33 + 3.29 \sin.(m\,30° + 104°\,46') + 5.33 \sin.(m\,60° + 303°\,25') + 0.76 \sin.(m\,90° + 300°\,58')$.

Place.	Years.	Authority.	Min.	Value.	Max.	Value.	Min.	Value.	Max.	Value.	εP_m.
Berlin,	1707–35	Kirch,	Jan. 1	1.28	March 10	15.94	July 16	1.26	Oct. 19	19.39	1.51
London,	1716–50	Eklöf,	Jan. 14	5.65	March 16	12.16	June 17	0.58	Oct. 25	18.43	2.20
Upsal,	1716–33	Celsius,	Dec. 27	8.85	March 1	13.65	June 19	0.11	Oct. 18	14.45	0.65
St. Petersburg,	1726–36	Delisle,	Jan. 0	2.55	March 14	14.70	June 19	1.72	Oct. 7	18.87	1.03
Italy,	1727–51	Beccari,	Dec. 27 Aug. 27	2.81 7.92	March 9	18.14	May 26	1.79	Oct. 21 Aug. 2	10.70 8.24	2.34
Utrecht, &c.,	1716–44	Musschen-[broek,	Jan. 0	5.35	April 20	15.16	July 11	4.00	Sept. 19	10.04	0.91
Carlsruhe,	1779–1831	Eisenlohr,	Jan. 6	2.59	March 0	18.13	June 17	3.18	Aug. 26	10.63	1.01
Montmorenci, &c.,	1771–80	Cotte,[3]	Dec. 16	5.15	March 19	12.23	July 3	2.96	Sept. 28	12.67	0.64
Wittemburg,	1731–50	Weidler,	Dec. 15	5.57	March 1	14.61	June 11	0.42	Sept. 28	14.07	1.64

[1] Acta Soc. Sci. Fennicæ, II. 302.

[2] This is the same as I employed in 1845, in discussing the daily changes of temperature and magnetic declination. — Memoirs of the American Academy, II. 44. Moigno, Leçons de Calculus, I. 527. Liouville, Journ. de Math., II. 193.

[3] As given by Bertholon, Kämtz, and Gehler. Cotte's Memoirs, &c., I. 366.

Quetelet[1] has given careful attention to the inquiry, whether any relation exists between the periodicity of the aurora and of shooting stars. He draws attention to the fact that while Mairan rejected the idea of any relationship between the two classes of phenomena, because he supposed auroras to be cosmical and shooting stars terrestrial in their origin, at the present day the shooting stars are believed to be of a planetary character and the aurora to be comparatively near to the earth's surface. Quetelet admits that the periodicity of auroras conforms to the recurrence of the seasons, and exhibits nearly the same periods of maxima and minima now as formerly, whereas the periodicity of the shooting stars stands in a less definite relation to the seasons, and the November period of maxima appears to have come in ancient times as early as the last days of October, and the August period between July 25 and 30. He rests his argument in favor of some affiliation between phenomena apparently disconnected on the fact that, out of twenty-eight unusual exhibitions of shooting stars since 1830, fifteen have been accompanied or preceded by auroras; viz., December 7 and 12, 1830; August 10 1831; November 13 1832; December 12, 1833; August 12, 1834; August 10 and November 15, 1836; November 15, 1837; October 18, November 13, and December 7, 1838; January 2, 1839; January 2, 1840; and August 11, 1841. Moreover, on August 15, 1830, and on November 12 and 14, 1839, when the expected display of shooting stars nearly failed, its place seemed to have been taken by an exhibition of aurora. Quetelet arrives at the following judicious conclusion: —

"Ces rapprochements ne prouvent sans doute pas que les étoiles filantés et les aurores boréales doivent être rangeés dans une même classe et ont une même origine: mais on peut raissonablement supposer que les causes qui amènent les unes peuvent favoriser la naissance des autres."

Wartmann[2] has also argued in favor of the common origin of shooting stars and the aurora, resting his proof on a few coincidences, such as those which happened on December 16, 1830; October 18, 1836, July 28, 1837; May 7, September 2, and October 22, 1839; July 5 and September 21, 1840. Facts such as the following have been quoted by others as indicating a relationship between the shooting stars and the aurora. Von Wrangel[3] observed, while in Siberia, that when shooting stars crossed the path of the aurora fiery beams started up in the space traversed. Airy[4] saw a single star shoot from the auroral beams of March 13, 1833. Bravais, while in Scandinavia, recorded one example of stars shooting from the region of the aurora.[5]

[1] Nouv. Mém. de l'Acad. Royale de Bruxelles. XV. 14.

[2] Bibliotheque Universelle, XXX. 206; and Quetelet's Correspond. Math. et Phys. XI. 182.

[3] Edinburgh New Phil. Journal, 1827, III. 381.

[4] London Philosophical Magazine, 3d Series, II. 316.

[5] See also on the same subject Wochenschrift für Astronomie, &c., II. 287.

Boué[1] has labored assiduously to establish a connection, such as is implied in a common origin, between different portions of the Physics of the Globe, and, possibly besides, between shooting stars and the zodiacal light. He questions the periodicity of the latter, and claims no correspondence in the periods of shooting stars and the aurora. But he argues earnestly, though in my opinion not very conclusively, in favor of some affiliation between auroras and earthquakes. He quotes largely from the voluminous catalogues of earthquakes published by Perrey in the Mémoires de L'Academie Impériale de Dijon and elsewhere. Perrey has arranged his data by months, years, and centuries, and finds some evidence of a secular period as well as of a yearly one. He also points out a coincidence between the periodicity of earthquakes and the monthly tides, the maximum appearing at syzygies and the minimum at quadratures. They are also more frequent when the moon is near the meridian than they are when the moon is 90° from the meridian. The monthly change he has developed by a periodical function similar to that which I have employed upon the aurora. Of the earthquakes which occurred in France, Belgium, and Holland, Perrey has made the following distribution among the months.[2] The second line of the table refers to earthquakes observed in the Antilles;[3] the third line to those observed in the Isle of Zante;[4] the fourth to those observed in Europe and the adjacent parts of Asia and Africa; the fifth to those observed in the whole of the Northern Hemisphere, as compiled by Mallet.[5]

Place.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
France, &c.,	83	64	53	55	42	36	47	40	50	48	60	78	656
Antilles,	15	16	23	17	16	16	20	23	22	20	18	15	221
Zante,	80	107	105	89	131	176	141	131	91	165	279	168	1663
Europe, &c.,	228	189	172	147	126	131	148	147	147	176	148	202	1961
N. Hemisphere,	627	539	503	489	438	428	415	488	463	516	473	500	5879

The frequency of earthquakes varies from month to month, but there is no resemblance between the law which governs this change and the yearly course of the aurora, or between the two sets of maxima and minima. The nearest approach to such an agreement is in the summer minimum. Boué attaches value to the fact that out of three hundred and fifty-one auroras observed by Hansteen and Herrick between 1837 and 1847, and four hundred and fifty-seven earthquakes compiled by Perrey, forty-seven correspond in the day and five in the hour of the occurrence, and fifty more coincide in time within one or two days. When Boué compared the same earthquakes with his own catalogue of eight hundred and eighty-three auroras, he found half of them to correspond within a day or two to some aurora, and from eight to ten within a single hour.

[1] Sitzungsberichte der Kaiserl. Akad. der Wissensch. XII. 459, 60.
[2] Mém. Couronn. et des Savans Etrang de l'Acad. Brux. XVIII. 97. [3] Mém. de l'Acad. Impér. de Dijon, for 1845,6, p. 385.
[4] Mém. de l'Acad. Impér. de Dijon. Deuxieme Serie, XI. 103. [5] Report of the British Assoc., XXVIII. Meeting, pp. 28 and 57.

I translate the following passage from Boué: —

"If the monthly frequency of northern lights and earthquakes is compared for a series of years, a decided and general correspondence is discovered between the tables of northern lights given by Mairan, Bertholon, and Muncke, and those which Perrey has made of earthquakes since the fourth century in northerly Europe and Asia, in western Europe, as well as in eight different basins and in south-eastern Europe. I do not mean a relative coincidence of numbers, but a somewhat similar mutual proportion of numbers for both classes of phenomena in each month of this series of years. If the tables of Perrey are compared with Hansteen's registers of the northern lights, the greatest disagreement falls upon the months of February and March as well as September and October. But May, June, July, and even August retain the same character for both classes of phenomena, as the months of minimum frequency. Decidedly in July and pre-eminently in June both are of great rarity." [1]

Baumhauer [2] has classified the recurrences of meteoric stones and fire-balls as follows:

Days.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1	4	2	5	2	.	1	.	.	4	6	1	3	28
2	6	.	3	1	2	2	.	.	.	2	1	4	21
3	1	4	2	1	.	3	1	6	1	3	1	1	24
4	2	2	1	3	1	2	2	1	4	1	3	2	24
5	1	.	.	3	1	1	.	4	2	1	2	3	18
6	2	7	2	2	.	1	1	5	1	3	4	1	29
7	2	3	1	.	2	2	1	5	.	1	2	.	19
8	3	4	5	2	2	.	1	4	4	4	1	4	34
9	3	2	2	5	1	4	.	2	2	.	4	2	27
10	3	2	2	4	3	.	.	7	7	2	2	2	34
11	1	2	1	3	1	.	1	3	1	4	2	4	23
12	3	1	4	1	2	3	1	5	.	3	8	2	33
13	6	1	3	3	1	3	4	3	6	3	9	6	48
14	1	1	2	1	1	1	1	2	3	1	3	2	19
15	3	2	3	1	1	1	.	4	.	.	2	2	19
M	.	1	1	.	.	.	2	1	1	.	.	.	6
16	2	.	1	.	2	1	3	1	3	1	2	2	18
17	1	1	.	4	5	2	10	.	.	3	4	2	32
18	2	6	2	2	1	.	2	2	1	2	2	3	25
19	.	3	1	4	4	4	1	2	1	1	5	2	28
20	2	.	1	.	2	.	3	4	2	5	4	1	24
21	1	1	2	.	2	.	2	.	.	2	1	3	14
22	.	1	4	.	6	1	1	4	3	3	1	3	27
23	1	2	1	.	1	.	1	4	2	5	1	.	18
24	3	.	2	.	.	.	3	.	2	2	1	2	15
25	3	1	1	.	.	.	.	.	1	1	3	3	13
26	4	3	.	3	2	.	2	2	1	1	2	1	21
27	2	4	.	2	2	.	1	.	.	3	4	1	19
28	3	1	1	3	1	1	4	3	2	1	2	1	23
29	.	.	2	2	1	2	6	.	2	1	5	3	24
30	2	.	4	2	1	1	2	.	1	1	2	2	18
31	1	.	2	.	2	.	2	.	.	2	.	1	10
F	1	.	.	.	.	.	.	3	.	.	.	.	4
( )	.	1	1	.	3	1	4	6	4	1	3	4	28
Total.	69	58	62	54	53	37	62	83	61	69	87	72	767

[1] Sitzungsberichte der Kaiserl. Akad. der Wissensch. Wien. XXII. p. 434.
[2] Pogg. Annalen der Physik und Chemie, LXVI. 477.

The days signalized by the frequency of these phenomena are November 12 and 13, August 10, April 9 and 10, December 13, November 27, 28, and 29, January 1 and 2 (all of which days according to Quetelet are distinguished by extraordinary numbers of shooting stars), and especially July 17. Baumhauer takes advantage of the fact that fire-balls, &c. are often surrounded, when they first appear, with a cloudy envelope. As nickel and magnetic iron enter largely into the composition of meteoric stones, he concludes that these substances are also one principal ingredient in the lighter matter which remains suspended in the air without falling to the earth. Hence he conjectures that this floating matter will be magnetized by the earth, arrange itself everywhere parallel to the resultant of the terrestrial magnetic forces at each place, and manifest itself, when from any cause rendered luminous, as the Aurora Borealis or Australis. Baumhauer thinks it desirable that the ground in high latitudes should be searched for nickel, since it is distributed so sparingly over the earth's surface that its presence at any place might be taken as a safe indication of meteoric materials. He adds that this hypothesis as to the origin of northern lights is sustained by the observations of Colla, Wartmann and Quetelet, who have pointed out the fact (?) that the times when the northern lights are most abundant coincide with the periods of greatest meteoric displays. Baumhauer modestly allows that his speculation in regard to the mutual dependence of various classes of phenomena in the Sun's system, viz., shooting stars, the fall of meteoric stones, and the northern lights, is only an attempt to introduce some order into what has been hitherto an immense chaos of facts.

Wolf has supplemented from his own learning the catalogue of meteorites and fire-balls, made by Kämtz and Biot.[1] He assigns to each day its proper number and publishes the following monthly means:

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Kämtz — Wolf,	82	59	71	65	59	48	60	85	74	79	101	92	875
Biot,	54	54	68	61	89	75	151	131	116	183	144	90	1216
Coulvier-Gravier,	4	6	4	3	5	7	15	40	13	11	16	11	135

Wolf selects the following days as conspicuously marked by the frequency of these occurrences: January *2* and 10; February 4, 6, and 18; March 1 and 31; April 9, 10, and 19; June 7; July 17 and *29;* August 3, 5, 7, *8*, *10* and *11;* September 1 and 13; October 1 and 3; November 9, *11*, *12*, *13*, 16, 19 and 29; December 2, 8, 11, 13, and 30; "also namentlich auch die Tage, welche sich constant oder wenigstens in einer grös-

[1] Vierteljahrsschrift der Naturforsch. Gesellschaft in Zürich. Jahrgang I. 322-32.

sern Anzahl von Jahren besonders reich an Sternschnuppen zeigten." Neither the days nor the months which are stamped with a deficiency or a superabundance of auroras reappear in these new phenomena as equally memorable.

Wolf[1] has arranged a collection of 5764 auroras, according to the days and months of the year. He has then constructed three curves: 1, the first according to the twelve monthly means; 2, the second according to the daily numbers; 3, the third according to means of each five successive days, giving six ordinates for every month. His maxima derived from the latter curve are near March 20 and October 15, and the minima near June 22 and December 25. The jaggedness of the second curve he attributes mainly to accidents of observation, remarking, however, that January 3 and 6, February 11 and 22, March 26 and 29, May 1, September 24, November 2, and December 20, are rich compared with the curve of monthly means; while February 14 and 21, March 31, October 28, and November 5 and 28 are comparatively lean. Moreover the third curve mounts unusually high during the first week of January and of July, that is, shortly after the periods of minima, and exhibits unusual depressions near the end of April and November. But these subordinate waves, which ride the back of the great yearly swell as a deferent, do not seem to me to point with any certain aim to the times for shooting stars and, through them, to the ring of meteors and the zodiacal lights. Wolf compares his Northern Light curve with the yearly changes of Magnetic Inclination as found by Hansteen, of magnetic storms as studied by Sabine, and of Solar Spot frequency[2] and Magnetic Declination as developed by his own researches, and he declares in favor of a prevailing agreement between them as exact as can be expected from the nature of the observations.

"Diese Vergleichung zeigt, dass im Allgemeinen wirklich eine so grosse Uebereinstimmung zwischen den verschiedenen Curven herrscht, als nur immer bei der Natur der zu Grunde gelegten Beobachtungsreihen erwartet werden kann, und wenn das erste Maximum der Nordlichtcurve vergleichungsweise etwas frühe, das zweite etwas spät einzutreten scheint, so ergibt sich hiefür eine einfache Erklarüng aus dem Zunehmen der Tageslänge im Frühjahr und dem Abnehmen der Tageslänge im Herbst, — ebenso fur das relative Verfrühen der beiden Minima's aus der durchschnittlich ungünstigeren Witterung um die Zeit der Solstitien. Auch die grosse Differenz zwischen den beiden Minima's der Nordlichtcurve wird offenbar durch die Verhältnisse der Tageslänge ungemein begünstigt."

A. de la Rive argues in favor of some association between appearances of the aurora and lunar halos, rain, snow, &c.

"Revenant à la coexistence des particules glacées dans l'air avec les aurores, nous en trouvons une preuve frappante dans les observations faites au Canada et aux Etats-Unis. Des registres d'observations météorologiques, tenus avec beau-

[1] Vierteljahrsschrift der Naturforsch. Gesellschaft in Zürich. Jahrgang II. 372, 3.

[2] Vierteljahrsschrift der Naturforsch. Gesellschaft in Zürich. Jahrgang I. 161, 263, and 269.

coup de soin, indiquent l'état de l'atmosphère les jours qui précèdent et qui suivent l'apparition d'aurores boréales. Or, presque toujours, l'aurore est précèdée de la chute de la pluie et surtout de la neige; il arrive aussi très-souvent, mais non tonjours, que cette chute a lieu aprés l'aurore. Enfin, l'apparition des halos luminares, qui précède le plus souvent celle des aurores boréales, est une preuve de la présence dans l'atmosphère de ces particules glacées qui forment le réseau illuminé par la transmission de l'électricité."[1]

Wartmann has considered the question, whether there is a special period of auroral display in October.[2] The influence of trade-winds and of a low barometer upon the aurora has also been discussed.[3] Broun has examined the recurrence of auroral displays in connection not only with the seasons, but also with the moon's age and magnetic disturbances. From his own short series of observations he has concluded that these disturbances, whatever and whenever they may be, which result in the development of the auroral light, agree with the magnetic disturbances of the earth in having a maximum at the opposition of the moon, and a minimum at the conjunction. These magnetic disturbances also conform to another law of the aurora; viz., they have maxima at the equinoxes and minima at the solstices, particularly at the summer solstice.[4]

Hansteen[5] has pointed out a yearly period in the changes of the magnetic inclination at Christiania; the two maxima occurring on April 1 and September 30, and the two minima on July 1 and December 31. If the solar spots can be linked with the earth's magnetism, and if the earth's magnetism can be associated with the aurora, may not the aurora and the sun's spots possess some bond of affinity? The solar spots have been tabulated by Wolf, month by month. The yearly curve resembles the variation in the star β Lyræ as found by Argelander. The principal minimum is in July, and a secondary one in November: the principal maximum is in October, and a secondary one in December. This yearly curve corresponds to that which expresses the magnetic changes as far as the principal maximum and minimum are concerned. But the magnetic curve has a secondary maximum in April and a minimum in January. Both phenomena exhibit clearly an annual periodicity; there are more solar spots from October to March inclusive than from April to September inclusive.[6]

Wolf[7] expresses the monthly frequency of the solar spots between the years 1833 and 1858 inclusive, by these relative numbers.

[1] Traité de l'Electricité, III. 295.

[2] Bibliotheque Universelle, XXX. 206.

[3] Bibliotheque Universelle, XLV. 89, and LXXXIII. See also the calculations of Fritz. Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich. IX. 124–8.

[4] Edinb. Phil. Trans. XIX. Pt. 2, p. lxxxi.

[5] Bulletin de l'Acad. Royale de Brux. XXI. 299. Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich. Jahrgang, II. 123, and 353; V. 36; VI. 179.

[6] Biblioth. Univ. Archiv. de Nat. et Phys. Sci. VIII. 41.

[7] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich. Jahrgang, I. 264; II. 120; V. 29 and 240.

Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
48.6	47.7	45.3	44.2	44.0	43.4	42.3	46.0	50.4	52.6	46.2	50.7

Wolf made an elaborate comparison, month by month and year by year, for the whole period between the years 1826 and 1848 inclusive, of the number of solar spots seen on days when the aurora was observed as compared with the general average. If the evidence was not decisive, it at any rate leaned to the opinion of Mairan that the aurora was concomitant with the development of solar spots more frequently than otherwise. He alludes emphatically to the spots and the aurora of the last of August and the first of September, 1859.

III. Pliny, after describing appearances in the heavens which evidently refer to the aurora borealis, adds these words: "Atque hæc ego statis temporibus naturæ, ut cætera arbitror existere." Ideler[1] quotes this passage with the following comment; "Novitne Plinius statis periodis auroram borealem apparere?" I have stated in an earlier memoir[2] the general argument for a secular periodicity in the recurrences of the aurora borealis. An appearance which is now so familiar was so strange in 1719 that the aurora of that year caused such terror throughout New England as to suspend "all amusements, all business, and even sleep, there being a general expectation of the approach of the final judgment."[3] In the early part of the present century the inhabitants of the Shetland Islands complained of the loss of this *useful* light which was so common in the last quarter of the preceding century; and the necessity of substituting artificial illumination for ordinary farming purposes.[4] The experiences and traditions of the Icelanders are of the same kind. Henderson[5] said in 1815: "I had an opportunity of contemplating them (auroras) almost every clear night during the whole winter." Compare this with the accounts of Anderson for the period between 1730 and 1747, and of Horrebows in 1749 and 1750.

Although there can be no doubt in regard to the *fact* of the *secular periodicity* of the Aurora Borealis, there may be great difficulty in ascertaining, with even an approximation to certainty, the period of this secular change: partly, because the period is long, and demands centuries of careful observations before it can be unmasked; partly, because the secular change is evidently entangled with other changes of smaller periods which there may be no means of eliminating. I have drawn the secular curve

[1] Meteorologia Veterum Græcorum et Romanorum, p. 52. [2] Mem. of the American Academy of Arts and Sciences, IX. 101.

[3] Regent's Reports of the Senate of New York, for 1836, p. 228. [4] Edinburgh New Phil. Journ. XVI. 35.

[5] Iceland or the Journal of a Residence in that Island, I. 357, and Nouvelle Description de l'Islande par Horrebows, trad. de l'Allemand.

for each place or each combination of places at which sufficiently long series of observations have been made; and, also, the mean curve for all the observations united. From this mean curve it has been necessary to exclude the *occasional* observations made in polar voyages, and in very high latitudes. The almost daily frequency of the aurora at such places would unduly inflate the curve for special epochs of observation unless balanced by continuous observation at the same places during the time of at least one secular period. For example: the series of observations on the aurora made at Moose Factory, Cumberland House, Athabasca Lake, Fort Reliance on Great Slave Lake, Fort Enterprise, Fort Confidence, Point Barrow, etc., which furnish from 100 to 150 auroras a year, are necessarily excluded, as the observations continued only two years or less. The unusual activity displayed by meteorologists during the few years that the Meteorological Society of the Palatinate was in operation put on record a large number of auroras which would otherwise have escaped, and which give an undue preponderance to that brief period.

Mairan, in his unrivalled discussion of the periodicity of the aurora, has exercised a wide discretion and exhibited the best judgment in the selection of his materials, instead of making an indiscriminate use of all:—

"Par exemple, tout pays où l'arriere-saison et l'Hiver ne preséntent aux yeux de l'Observateur, pendant des mois entiers, qu'un Ciel toûjours couvert, qu'un temps pluvieux ou chargé de brouillard, doit être exclus de nos Comparaisons et de nos calculs. Car de semblables pays ne pourroient nous fournir dans cette partie de l'année que quelques grandes Aurores Boréales, et il s'agit ici du nombre plutôt que de la grandeur. Eh quel usage faire en ce cas d'une Comparaison où l'un des termes seroit si défectueux, et manqueroit quelquefois totalement? Par une semblable raison je rejetterai les observations faites dans des pays trop Polaires et où le Soleil seroit des jours et des mois entiers sur l'horizon, dans la saison opposée à la précédente; car il n'y auroit encore alors que les très-grandes Aurores Boréales qui pussent s'y montrer, tandis qu'on en auroit observé un tres-grand nombre d'autres qui auroient paru en Hiver."[1]

For these reasons Mairan omits the observations made by Croyere in the North of Russia, at Kola, at Kilduin, and on the shores of the frozen sea, two or three degrees beyond the Polar Circle.

Satisfactory observations on the aurora have been made only during the last one hundred and fifty years. And even during this choicest period, the number of constant and systematic observers in the field, as well as their station of observation, has varied. Sometimes there have been none; at other times not less than a dozen. These fluctuations would have affected the mean curve more injuriously were it not for the fact that the zeal of observers died out when the auroras died out, and was rekindled again

[1] Traité Physique et Historique de l'Aurore Boréale, pp. 488 and 509.

as soon as auroras became more frequent and more splendid. How much or how little our confidence in the mean curve can reasonably be impaired by interruptions in the data may be found by comparing the mean curve with the particular curves, for special places, and also by examining to what extent many observers simply duplicate each other's observations, without adding to the number of recorded auroras. If an examination is made of the records of auroras seen since 1700, it reveals the fact that the displays reached a maximum of frequency about the year 1730. The St. Petersburg series agrees with the general table (after excluding cases which fall within Mairan's exceptions) in assigning the maximum to the year 1730. The miscellaneous observations which Mairan groups under the title of "Philosophical Transactions of London," place this maximum as early as 1726, and the Wittemberg series as late as 1742, though there was another inferior maximum in 1731. In Berlin it was the year 1732, in England, according to Huxham, it was the year 1736, and in Italy it was the year 1737 which claimed the maximum. The series of auroras observed in Sweden discloses one maximum in 1730, and another slightly greater in 1741.

This maximum was followed, after an interval of about twenty-five years, by a minimum, which, on the average of all the reliable series, belongs to the year 1758. The only four series of observations which extend over this period of time correspond strikingly with each other, as also with the mean. The Cambridge series gives a minimum to the year 1755, the Swedish series to the same year, the St. Petersburg set to the years 1753–4, and the observations at Abo to the year 1757. Another sudden and low depression in the year 1766 is worthy of mention. Not a single aurora was observed that year either in Cambridge or St. Petersburg. One was seen in England and six at Abo, this secondary minimum appearing the next year at Abo, when only four auroras were observed; whereas in 1757, the year of the principal minimum, there was one solitary observation at that place.

About the year 1787 another maximum is reached. The observations made at Abo, Ratisbon, Prague, Mannheim, and Paris agree separately on the same year as the mean curve gives. The series of Cambridge, Berlin, and Brussels transfer this maximum to the year 1786; those of Jena, Kendal and Keswick, and Sagan, to the year 1788; those of St. Petersburg to 1786, though a more decided maximum occurred at that place in the year 1774; the observations at New Haven bring this maximum as early as 1781, but another maximum almost as great is found in the year 1786, whereas those at Stockholm postpone it to 1790. There is a maximum in the series at Montmorenci in the year 1787, but a greater one in 1779; a maximum appears to have come at least as early as 1779 at Carlsruhe. At Copenhagen one maximum occurred in 1787, and a

greater one in 1782–3. Olmsted[1] placed this maximum somewhere between the limits of 1760 and 1783, and Loomis decides that its epoch is about 1780. Ussher[2] alludes to the greater frequency of the aurora in 1788 as compared with the preceding half century.

The mean interval between the two grand maxima which I have described is fifty-seven years. The uninterrupted series at St. Petersburg leaves fifty-six years between the two maxima, the broken series at Berlin only fifty-four years, and the Huxham and Dalton catalogues, combined, only fifty-two years.

A second minimum comes along about the year 1812. No aurora was seen in Salem between the years 1810 and 1813 inclusive; nor in New Haven between 1808 and 1813; nor in Great Britain between the years 1809 and 1813. None is registered for St. Petersburg between 1809 and 1823; nor at Abo between 1806 and 1816. During the last one hundred and fifty years the aurora has failed utterly of being registered anywhere on the earth, only in the years 1812 and 1813.

A third grand maximum returns in 1849. The Cambridge observations alone postpone it to the year 1852, and the New Haven observations hasten it on as early as 1847. In New York it was the year 1850; in Providence, 1852; in Newberry, 1853. In Worcester the principal maximum was in 1840, but there was another in 1848. The short series at Dunse exhibits a maximum in 1843, and that at Makerstoun in 1845. In Christiania there was a maximum in 1852, but a greater one in 1842. In Jakobshavn the maximum of a few years falls upon 1845. The interval between the second and third maxima is about sixty-two years. The Cambridge observations alone imply an interval of sixty-six years, and those of New Haven either sixty-one or sixty-six years, according to the epoch selected for the earlier maximum. There is no other single series which spans the long period between these two maxima, the aurora not being as regularly observed now as formerly at St. Petersburg, and its presence being inferred from magnetic disturbances rather than from direct observation upon the light itself. I have been surprised to see no auroras included in the observations at Sitka in 1853, although there is mention made of many extraordinary magnetic disturbances.[3] Loomis concludes that the average period is about fifty-eight years. Santini[4] sets it as high as sixty-five years. This was also the period which Olmsted adopted. Observations in the Western continent would seem to indicate that the last grand maximum was superior to its predecessor, while the European observations imply the contrary. The multiplication of observers, which explains the first fact, only renders the other more mysterious. Quetelet, who observed at Brussels, adverts to this peculiarity, saying that between 1778

[1] Smithsonian Contributions, VIII. 38, 9.

[2] Trans. Roy. Irish Acad. 1788, II. 191.

[3] Annal. de l'Observ. Phys. Centrale de Russie, 1853, p. 851, &c.

[4] Wochenschrift für Astronomie, Meteorologie, &c. 1862, V. 14.

and 1787 auroras averaged twenty a year; whereas, between 1832 and 1852, there were only two a year, and in 1844 and 1845 none.[1]

The observations prior to 1700 are so meagre that, instead of taking each year singly, I have made groups of ten years each, beginning with the year 1309. Neglecting the observations made at the close of the seventeenth century by Grebner, at Breslau, about which Forbes himself has great doubts, I can easily select the years 1575, 1625, and 1685, as approximate periods of recurring maxima, the successive intervals from one to the other, and from the last to 1730, exhibiting a rough agreement with the periodicity derived from observations of the last one hundred and fifty years.

Passing next to still earlier records of the aurora, I may mention the years 585, 675, 805, 845, 995, 1115, 1195, 1355, and 1545 as representing decades in which the number of recorded auroras ran ahead of the average. No weighty conclusion for or against the interval, already assigned to the more recent maxima, can be drawn from these conspicuous decades. For, by varying the interval to any value between fifty-two and sixty-two years, as might be done consistently with the evidence, and then taking a larger or smaller multiple of that interval, any decade whatever could be suited to a maximum. From 1575 back to 1545 is a short interval of only thirty years. Between 1545 and 1355 there are one hundred and ninety years, which are consistent with three intervals, each of about sixty-three years. From 1355 to 1195 are one hundred and sixty years, which will divide into three intervals of about fifty-three years each. Between 1195 and 1115 are eighty years, which might be divided into two intervals of forty years each. Between 1115 and 995 are one hundred and twenty years, which may contain two intervals of sixty years. From 995 to 845 are one hundred and fifty years, or three intervals of fifty years. From 845 to 805 there is only one short interval of forty years. From 805 back to 675 are two intervals of sixty-five years. From 675 to 585 are two intervals of only forty-five years.

Although the earliest as well as the latest recorded observations of the aurora give unmistakable evidence of the intermittent character of the phenomenon, it is obvious that science must rely exclusively upon the observations of the last three hundred years, and chiefly upon the observations of the last century and a half, for its best determination of the precise interval between successive maxima. Facts as well as analogy favor the suspicion that the interval itself may vary from one century to another, though a variation between forty and sixty years may seem an extravagant supposition. But for the law of this variation, and, indeed, for any certainty as to the fact of the varia-

[1] Annales de l'Observ. Royale de Brux. XI. 42.

tion itself, we must wait for centuries of additional observations, unless some happy generalization, as to the physical cause of auroral displays, shall illuminate and render transparent the obscure and scanty records of the past.

When Mairan published the first edition of his *Traité de l'Aurore Boréale*, in 1733, he pointed out what he supposed to be twenty-two returns (*reprises*) of the aurora. But his deductions were based on only 229 auroras, all but 59 observed since 1707. Twenty of his great returns were therefore predicated upon only 59 recorded appearances, and were the results of negative rather than of positive evidence. Indeed, in his catalogue, one observation or a small cluster of observations stamped a year as one of maximum frequency, the intermediate years being unrepresented in any record. The intervals between these returns varied from ten to two hundred years. Mairan[1] made no attempt at discovering a specific interval between the recurring maxima. He says:—

"Depuis le milieu du XII^me^ siècle jusqu'au milieu du XIV^me^, je ne trouve rien qui puisse être pris certainement pour l'Aurore Boréale. . . . . Ce qui donneroit, depuis 1157, une interruption au Phénomène de pres de 200 ans s'il n'etoit à craindre que ce ne soient seulement les Observateurs et les Historiens qui nous manquent."

And again (page 185), Mairan says:—

"Depuis 1621 jusqu'en 1686, c'est-a-dire, dans l'intervalle de plus de 60 années, je ne trouve aucune observation bien marquée de l'Aurore Boréale, et l'on sait cependant quels Astronomes et quels Observateurs il y a eu pendant ces temps-là. De sorte que l'on peut compter cette interruption du Phénomène comme une des plus longues, entre celles qui sont le mieux constatées."

In the second edition of Mairan's work, published in 1754, are added 1441 auroras, of which 302 were prior to 1707. Moreover, between the years 1157 and 1351, where at first he supposed there was a dismal blank, he has collected from other sources four examples, and between the years 1621 and 1686, where he thought there was a perfect vacancy, he afterwards placed 81 auroras. Indeed, between the years 1622 and 1634 inclusive there are 49 auroras, and the single year 1629 is a conspicuous maximum. If Mairan had revised his *reprises*, in view of the much larger materials he had in his hands when publishing his second edition, he would no doubt have modified the epochs to suit his enlarged knowledge; but he had no special occasion to reconsider that part of his general subject.

Our distinguished foreign associate Hansteen, after noticing the frequency of the

[1] Traité Physique et Historique de l'Aurore Boréale, p. 179–83.

aurora about the year 1830, of which he could recall no parallel since the days of his boyhood or since 1793, adds: —

"Von solchen Perioden habe ich geglaubt seit dem Jahre 502 vor Christi Geburt bis auf unsere Zeit 24 nachweisen zu können, von welchen besonders die neunte, von 541 bis 603, die zwölfte, von 823 bis 887, die zweiundzwanzigste, von 1517 bis 1588, und die vierundzwanzigste, von 1707 bis 1788 sich durch ungewöhnlich starke und häufige Nordlichter anszeichneten."[1]

Hansteen's periods of auroral display vary accordingly from sixty-two years to eighty-one years. It does not seem to me, however, that such of the periods as he has specified are those which group the phenomena together most naturally; and in the case of the twenty-second period, which he makes to begin in 1707 and end in 1788 and culminate about 1752, it may be objected that the observations indicate one maximum about 1730 and another about 1790, and a closer approach to a minimum than to a maximum about 1752. The observations, however, made by Celsius in Sweden, to which, no doubt, Hansteen attached great weight in forming his opinion, are less decisive on this point than those made at St. Petersburg or Cambridge.

A very cursory glance at the curves which represent the frequency of the aurora from year to year will detect the influence of other periodical fluctuations shorter than the secular one and superadded to it. In the year 1803, Ritter of Jena maintained that the aurora was subject to a periodical variation once in nine or ten years, and that this short period of the aurora was associated with the period of 18.6 years in the moon's motion, therefore with the larger nutation-period of the earth's axis, so much so that the minimum for the aurora corresponded to the largestand smal lest obliquity of the ecliptic, and the maximum of the aurora to each intermediate mean obliquity when the longitude of the ascending node of the moon was 90° or 180°. From all which Ritter concluded that the connection of the moon with the aurora was unquestionable. He predicted such a maximum for the year 1806 and another for 1816.[2]

I have given in Table LIII. the years of maximum, minimum, and mean obliquities, and also the years of maximum and minimum frequency in the aurora. The latter are printed in capitals, where there is a plausible agreement with Ritter's theory. Although the coincidences between the facts and the theory are in some parts remarkable, the discrepancies are numerous and large: too numerous and too large to be reconciled with the truth of the theory. It may be stated, for the benefit of any one who wishes to pursue the comparison further, that the years 1602, 1611, 1620, 1630,

[1] Pogg. Annalen der Physik und Chemie, XXII. 536, 7. [2] Gilbert, Annalen der Physik, XV. 210, 220, and XVI. 226.

1640, 1648, 1658, 1667, 1676, 1685, 1695, and 1704, are, by Ritter's supposition, years of maximum for the aurora. Hansteen[1] appears to be satisfied with the result of Ritter's prediction for the years 1806 and 1816; and he himself adduces the year 1843 as an additional confirmation of the theory. Fritz quotes from Höslin[2] to the effect that the latter had advanced a theory similar to Ritter's as early as 1784. Fritz himself calls attention to the fact that Ritter's maxima often concur with those of the solar spots, and that, when they differ, the aurora mounts to at least a secondary maximum in Ritter's years of mean obliquity, as was conspicuously true of the year 1797. The year 1830, however, is an exception. But Fritz adds, that about this time the Ritter and spot maxima were opposed to each other, whereas, in 1769, 1779, and 1788, the periods of both classes of maxima coincided.[3] Böckman also had intimated that the great moon-period might determine the recurrence of auroras.[4]

TABLE LIII.

Maximum Obliquity.	Mean Obliquity.	Minimum Obliquity.	Maximum Aurora.	Minimum Aurora.	Maximum Aurora.	Minimum Aurora.	Maximum Aurora.	Mininum Aurora.	Maximum Aurora.	Minimum Aurora.
		1717.3								
	1722.0									
1726.6			Upsal.		St. Peters'g.		Berlin.		Mean.	
	1731.3		1730		1730		1730-3		1730	Mean.
		1736.0								1733–8
	1740.6		1741	Upsal.	1742		1742		1741	
1745.3				1744			Abo.	Abo.		
	1750.0					St. Peters'g.	1752			
		1754.6		1755		1756		1757		
	1759.3		1760		1762		1761			1758
1764.0			Berlin.					1765		
	1768.6		1771			1766	1768			1766
		1773.3	Jena &c.		1774		1774		1774	
	1778.0		1779					1779	1779	
1782.6			Sweden &c.							
	1787.3		1786	Cambridge.	1786	1791	1787		1787	
		1792.0		1791						
	1796.6			Paris &c.		Salem.		1798		1796
1801.3				1799		1798				
	1806.0			G. Britain.			1804	New Haven.	1805	
		1810.6		1811	Carlsruhe.	1811		1810-5		1812–5
	1815.3		Archangel.		1817		Salem.			
1820.0			1819				1819		1818	
	1824.6		G. Britain.	1823	New York.		Abo.			1823 ?
		1829.3	1830		1830		1830	Abo.	1830	
	1834.0							1834		1832-5?
1838.6			Norway.						1840	
	1843.3		1842	Norway.	1840–5	New York.		Cambridge.		1844
		1848.0		1845	Newberry.	1844–5	Cambridge.	1843	1849	
	1852.6		1852		1853		1852	Worcester.		
1857.3							Worcester	1856		1856
	1862.0						1860			

[1] Nouveaux Mém. de l'Acad. Royale de Brux. XX. 118. [2] Meteorologische und Witterungsbeobachtungen, Tübingen, 1784.
[3] Vierteljahrsschrift der Naturforsch. Gesellschaft in Zürich, X. 230, 258. [4] Gilbert, Annalen der Physik VII. 32.

In 1851 Lamont[1] announced the discovery of a *ten year* period in the amplitude of the diurnal oscillation of the magnetic needle. This discovery reposed on the nice observations which had been instituted at the Magnetic Observatory of Munich. Ten years afterwards[2] he assigned the length of this periodical change with greater precision, making it 10.43 years. The maxima or minima occur in the following years:—

Maximum, 1786.5	Maximum, 1837.5	Maximum, 1848.8	Maximum, 1859.5
Minimum, 1817.0	Minimum, 1843.0	Minimum, 1855.0	

Sabine[3] soon discovered that this decennial period appeared in the observations made between 1843 and 1848 at the magnetic observatories of the British Colonies, viz., at Toronto and Hobarton[3]; and was applicable not only to the changes in the amplitude of the diurnal oscillation but to the *frequency of the irregular disturbances*. Wolf recognized the same law in the magnetic observations made in Prague and Kremsmunster. Afterwards, Bache[4] discussed the magnetic observations made for two or three years at the Girard College, in Philadelphia, and detected traces of the decennial period not only in the changes of the *declination* but also in those of the *horizontal component of the earth's magnetic intensity*.

The decennial period is approximately the same for all parts of the earth. Hansteen[5] saw it confirmed in his own long series of twenty-five years of magnetic observations at Christiania; and, with Sabine and Lamont, he extended it to the *inclination* and the *intensity*. Hansteen computed the period of the magnetic changes, and found its length to be 11.33 years. Observations on Terrestrial Magnetism are defective between the years 1798 and 1813, while Europe was disturbed by war. Still, no doubt remains in regard to the fact of a nearly decennial fluctuation. The precise period of the oscillation may be hereafter slightly corrected, and may itself suffer a secular variation.

In the mean while Wolf,[6] now of Zurich, was engaged in studying into the laws of periodicity of the solar spots. He availed himself of the long and faithful observations which Schwabe[7] had been making, at Dessau, since 1826. Schwabe himself saw in

[1] Sitzungsberichte der Königl. Bayer. Akad. der Wissensch. zu Munchen, 1862, II. Heft II. 71. Pogg. Ann. der Physik und Chemie, LXXXIV. 572, LXXXV. 412-20, and LXXXVI. 88.

[2] Pogg. Ann. der Chemie und Physik, CXVI. 607. Biblioth. Univ. Archiv. de Nat. et Phys. Sci. XIX. 306.

[3] Phil. Trans. Roy. Soc. London, 1851, 2, and 3.

[4] U. S. Coast Survey Reports, 1859 and 1862. Proc. American Assoc. for the Advancement of Science, XIII. 251.

[5] Astronomische Nachrichten, XLV. 195.

[6] Compt. Rend. XXXV. 364. Astronomische Nachrichten, XXXIV. 159 and XXXV. 369. Mittheil. der Berner Naturforsch. Gesellsch. No. 245, p. 183.

[7] Astronomische Nachrichten, XXI. 235.

these observations indications of a decennial period, and pointed out the years numerically poorest or richest in solar spots. Wolf changed the length of the period to 11.11 years. Some observations, recently brought to light by Thiele, prove that as early as 1775 Horrebow had a glimpse of the existence of some law of periodicity in the frequency of solar spots.[1]

Since this first announcement many eyes have watched sedulously the spots upon the sun, and the archives of science have been ransacked by Wolf and his co-laborers for old observations. More than eleven hundred volumes, printed or manuscript, have been searched, and from their pages Wolf[2] has gathered 23000 observed spots, extending over one hundred and twelve years, between 1749 and 1860. Observations of the solar spots have been accumulated on 22493 days, viz., on 2143 days in the 17th century, on 5490 days in the 18th century, and on 14860 days in the 19th century.

From these multiplied materials Wolf has been able to write out an almost consecutive history of the transactions on the sun's surface from the year 1610 to the present moment. The interval between successive maxima varies between the extremes of 8.2 years and 15.5 years; the same period returning once in 79 or 85 years. The mean length of the period, derived from the minima alone, is 11.17 years; and from the maxima alone 11.02 years. The observations anterior to 1750 require a period of 11.15 years. The great difference between the particular and the mean values of the period made the year 1788 the year of the *real maximum*, and also the year of the *mean minimum*. Wolf thinks that there is reason to suppose that unusual activity in the forces which develop the solar spots results also in a diminution of the period between successive maxima.[3]

Table LIV. exhibits the years of maxima and minima which Wolf[4] has deduced from the materials in his hands, and the intervals between them. He calculates that the formula, —

$$E_x = 1732.823 + x.\ 11.119,$$

satisfies best the observed minima, on the presumption that the period is constant. But the difference between the calculated and observed years of minima amounts sometimes to more than three years. He substitutes, therefore, for the first formula another, which recognizes the variability of the period itself[5]: —

[1] Astronomische Nachrichten, L. 257.

[2] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, VI. 175. Biblioth. Univ. Archiv. de Nat. et Phys. Sci. X. 260.

[3] Astron. Nachr. LIV. 346. Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, VI. 192. Pogg. Annalen der Physik und Chemie, CXVII. 505.

[4] Pogg. Annalen der Chemie und der Physik, CXVII. 505. Astronomische Nachrichten, LIII. 338, and LIV. 257.

[5] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, III. 136, IV. 215–17, V. 247–250, VI. 188–190, and X. 355–58.

$$E_x = 1732.823 + x.\,11.119 + 1.621 \text{ sin. } (146° + x\,\frac{360°}{15}) + 1.405 \text{ sin. } [230° + x\,\frac{360°}{5}].$$

This was afterwards changed to the following: —

$$E_x = 1799.455 + x.\,11.153 + 1.621 \text{ sin. } [290° + x\,\frac{360}{15}] + 1.405 \text{ sin. } [302° + x\,\frac{360°}{5}].$$

Wolf makes the uncertainty in a single epoch by the usual formula, $\varepsilon = \sqrt{\frac{S\,\Delta^2}{n-1}}$, equal to 1.575 years for the periods of minima, and 1.870 years for the periods of maxima. The uncertainty in the value of the mean period is by the maxima alone equal to .418 of a year, and by the minima alone equal to .336 of a year, according to the usual formula, $r = \sqrt{\frac{\varepsilon}{n}}$.

TABLE LIV.

Maxima.	Intervals.	Minima.	Intervals.	Maxima.	Intervals.	Minima.	Intervals.
		1610.8		1738.5	11.0	1745.0	11.5
		1619.0	8.2	1750.0	11.5	1755.7	10.7
1626.0		1634.0	15.0	1761.5	11.5	1766.5	10.8
		1645.0	11.0	1770.0	8.5	1775.8	9.3
		1655.0	10.0	1779.5	9.5	1784.8	9.0
		1666.0	11.0	1788.5	9.0	1798.5	13.7
1675.0		1679.5	13.5	1804.0	15.5	1810.5	12.0
1685.0	10.0	1689.5	10.0	1816.8	12.8	1823.2	12.7
1693.0	8.0	1698.0	8.5	1829.5	12.7	1833.8	10.6
1705.0	12.0	1712.0	14.0	1837.2	7.7	1844.0	10.2
1717.5	12.5	1723.0	11.0	1848.6	11.4	1856.2	12.2
1727.5	10.0	1733.5	10.5	1860.5	11.9	1868.3[1]	

Wolf says of his last formula: —

"Immerhin gebe ich sie nur als einen ersten Versuch, und behalte mir vor, in der Folgezeit, sei es ihre Constanten noch etwas abzuändern, sei es durch Zufügen weiterer Glieder ein noch besseres Anschmiegen zu erzielen."

What gave extraordinary interest to these two apparently insulated discoveries, the first in the Physics of the Globe and the second in Astronomy, was the additional one that they were intimately associated with each other, the maximum of magnetic disturbance occurring simultaneously with the maximum frequency in the solar spots. This latter discovery was made almost at the same time by Sabine, Wolf, Secchi,[2] and Gautier,[3] though Gautier admits that Sabine had the priority in time. With Sabine,

[1] Predicted.

[2] Arago, Astronomie, II. 180. Pogg. Ann. der Physik und Chemie, CXVII. 503.

[3] Biblioth. Univ. Archiv. de Nat. et Phys. Sci. XX. 189, XXXVI. 185. Also, Bib. Univ., Nouvelle Period II. 365, and V. 296.

Secchi, and Gautier the conclusion rested on the comparison of recent observations both of the solar spots and of the magnetic disturbances. Wolf has pursued the subject farther, and coupled with his long list of years numerically rich or poor in solar spots such observations on the amplitude of the diurnal oscillation of the magnetic needle as he was able to hunt up. The result of his investigation is contained in Table LV. In the case of the Declination and the Inclination, the maxima and minima of the magnetic changes coincide nearly with the maxima and minima of the solar spots. But in the variations of the Horizontal component of the Magnetic Force the maxima fall upon the same years as the minima of the solar spots.[1]

TABLE LV.

Spot Maximum. Wolf.	Magnetic Maximum. Wolf.	Magnetic Maximum. Lamont.	Spot Minimum. Wolf.	Magnetic Minimum. Wolf.	Magnetic Minimum. Lamont.
1750.0					
1761.5			1755.7		
1770.0			1766.5		
1779.5			1775.8		
1788.5	1787.2	1786.5	1784.8	1784.5	
		1796.5			1791.3
1804.0	1803.5		1798.5	1799.0	
1816.8	1817.5	1817.0	1810.5		
1829.5	1829.7	1829.0	1823.2	1823.8	1823.3
1837.2	1837.7	1837.5	1833.8		
1848.0	1848.9	1848.8	1844.0	1844.2	1843.0
1860.2	1860.0	1859.5	1856.2	1856.3	1855.0

It will be seen from Table LV. that Wolf and Lamont are not agreed as to the exact times of the magnetic maxima and minima. Wolf maintains that the periodicity of the magnetic changes is the same as that of the solar spots, viz., 11.11 years; while Lamont insists on his original period of 10.43 years for the magnetic fluctuations. Wolf[2] divides the whole interval between 1786 and 1860 into six periods of very unequal length; Lamont divides the same interval into seven periods of equal length. Hence Lamont has a maximum in 1796.5, and a minimum in 1791.3, the maximum nearly coinciding with Wolf's minimum of 1798.5. Sabine[3] concurs with Lamont in thinking that a period of 10 years fits the magnetic movements better than a period of 11 years. Hansteen, on the contrary, deduced from his own observations at Christiania a period for the magnetic inclination and intensity which conformed to Wolf's period of 11.11

[1] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, V. 240, 1; Pogg. Annalen der Chemie und Physik, CXVII. 505–8.

[2] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, II. 293, and X. 160.

[3] Magnetical and Meteorological Observations at St. Helena, II. 136.

years more exactly than to Lamont's period of 10.43 years, or Sabine's of only 10 years.[1] Wolf claims that the phenomena of the earth's magnetism run parallel with those of the sun's spots not only in their general march but in all their exceptional digressions. Lamont reposes less confidence than Wolf in the earlier observations not only of the sun's spots but also of the magnetic elements; and in this opinion the astronomer Johnson[2] appears to coincide. Lamont admits merely a general resemblance without any minute coincidence in the progress of the two classes of phenomena. His words are: —

"Das jedenfalls merkwürdige Zusammentreffen der Maxima und Minima bei den magnetischen Bewegungen und den Sonnenflecken kann hiernach als ein eigentlicher Causal-Nexus nicht erkannt werden, &c."[3]

Wolf insists that his formula,

$$B = 6.273 + 0.051\ a,$$

in which B is the variation in magnetic declination and a the relative number of spots, represents the magnetic observations at Munich, from 1835 to 1850 inclusive, as accurately as Lamont's formula for the declination derived from the observations themselves, —

$$B = 8'.70 + 2'.1 \sin.[72°.58 + n.\ 34°.84],$$

(n) being the years elapsed since the epoch, 1848. Wolf afterwards modified this formula, and obtained similar ones for other localities.[4]

W. Herschel and Gruithuisen inferred from their own comparisons that an abundance of solar spots was accompanied with an increase in the mean temperature of the earth. Arago arrived at the opposite conclusion from observations made at Paris between the years 1826 and 1851. Secchi's observations in Rome corresponded with Arago's conclusion. Wolf has renewed the inquiry, and with enlarged materials has sought to reconcile the apparent incongruity here exposed by the fact that between the years 1760 and 1802 the mean temperature was highest in years rich in solar spots, whereas the opposite rule held between the years 1803 and 1847. On this subject a paper by Gautier[5] of Geneva may be consulted to advantage. It will be a wonderful fact, whenever it is established, that changes in the number and activity of

[1] Bulletin de l'Acad. Royale de Brux. 2 S. VI. 358, 9. [2] Memoirs of the Astronomical Society of London, XXVI. 201.
[3] Sitzungsberichte der Königlich. Bayer. Akad. der Wissensch. 1862, II. Heft II. 74.
[4] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, IV. 222, 223, VI. 416, IX. 120, and X. 361.
[5] Annales de Chimie et de Physique, XII. 57–67; Bibliotheque Universelle, LI. 327.

the solar spots, which produce none or at most a doubtful disturbance in the earth's temperature, have written themselves plainly out in the history of the earth's magnetism and of the aurora.[1]

" Who would have supposed a few years ago," asks Wolf, " that any terrestrial phenomena could have been studied by watching only the spots upon the sun? "

In view of the possible connection between the aurora and the solar spots, the following quotation from Mairan[2] is significant: —

" Et ne pourroit-on point découvrir quelque analogie entre la fréquence, les cessations et les retours des ces Taches et les apparitions, les retours et les cessations de la Lumière Zodiacal?

" C'etoit assez le sentiment de feu M. *Cassini*, 'Notre lumière, dit-il, dans son Discours sur ce Phénomène, pourroit avoir les vicissitudes qu'ont les Taches du Soleil, qui se forment en certains temps et se dissipent en d'autres; et, c'est une chose assez remarkable, que depuis là fin de l'année 1688, que cette lumière a commencé de s'affoiblir, il n'a plus paru de Taches dans le Soleil, où les années précédentes elles étoient assez fréquentes; ce qui semble appuyer en quelque manière les conjectures exposées aux nombres 21 et 22, que cette Lumière peut venir du même écoulement que les Taches et les Facules du Soleil. . . . Ce qui parôit favoriser cette idée, c'est que depuis cinq à six ans que les Aurore Boréales, suite ordinaire, selon notre hypothése, des grandes extensions de cet Air, sont devenues si fréquentes, les Taches du Soliel l'ont été aussi beaucoup. On sait encore qu'au commencement du dernier siècle, après l'invention des lunettes, on ne voyoit presque jamais le Soleil sans Taches; et il en avoit quelquefois des amas si considérables, que le P. *Scheiner* dit y en avoir compté une fois jusqu'a cinquante. Elles devinnrent ensuite plus rares: de manière que depuis le milieu du siècle jusqu'en 1670, c'est-à-dire, dans l'espace d'une vingtaine d'années, on n'en pût trouver qu'une ou deux et qui parurent même fort peu de temps. Or comme nous l'avons vû, il y eut un grand nombre d'Aurores Boréales au commencement de ce siècle, et jusques au delà de 1621; après quoi l'on n'en entend plus parler jusqu'en 1686. Cependant il faut avouer qu'il n'y a encore rien de solide a établir sur cette correspondance apparente, et qu'elle ne se soûtient pas toujours également. Car les années qui suivirent 1621, 1622, &c., et où l'on dût redoubler d'attention pour la Lumière Septentrionale, purent peu marquées par l'apparition de ce Phénomène, quoique les Taches du Soleil y fussent en aussi grande abondance que jamais, comme on le voit dans le *P. Scheiner*.'"

In 1831 Littrow[3] hinted that the northern lights, like the solar spots, submitted to laws of periodicity. Again in 1853, Stevenson[4] cited his own observations on the aurora, made at Dunse, North Britain, as favoring the hypothesis of a minimum in 1843, synchronously with the minimum in the solar spots and the magnetic disturbances.

After Fritz had accumulated sixty-three hundred observed auroras, he draws thirteen *secular* curves, one for the whole year and one also for each month:[5] in order to compare the maxima and minima of these curves with those of another

[1] Vierteljahrsschrift der Naturforsch. Gesellsch. IV. 217–23; VI. 182.

[2] Traité Physique et Historique de l'Aurore Boréale, p. 264.

[3] Vermischte Schriften, im Aufsatze ueber das Nordlicht.

[4] Proceedings of the Royal Society of London, VI. 291.

[5] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, Jahrgang VIII. 108.

curve the ordinates of which represent the various richness of the years in solar spots. The most conspicuous maxima of the aurora-curve are in the years 1730, 1769, 1779, 1788, 1839 and 1848: of the spot-curve, they are in the years 1769, 1779, 1787, 1837 and 1848. The principal minima of the aurora-curve are in the years 1758 and 1809–13: the most decided minima of solar-spots are in the years 1755 and 1810. Fritz thinks it probable that the secular period embraces, on the average, five of the eleven-year periods or 55.55 years.

Wolf[1] draws a secular curve through the *summits* of the undulations expressing the relative numbers of solar spots, and its maxima appear in the years 1779 and 1837, and its minima in 1816 and 1860. He draws another secular curve through the lowest points of the undulations and the maxima occur in 1775 and 1833–4, and the minima in 1810 and 1856. The long swell is equal to five or six of the short waves. Carrington[2] explains the smaller elevation of the summits of the secular curve of the solar spots in the latter part of the last century, when compared with the summits of the present century, by improvements in telescopes or by an increase in the number of observers.

The eleven-year period of the spots rides also on the back of the secular curve of the aurora, these subordinate maxima and minima of the two phenomena coinciding. The years 1723, 1733, and 1745, which are known approximately to be spot minima, are also deficient in auroras. Such exceptions as appear in the interval between 1813 and 1820 Fritz explains by the incompleteness of the catalogues, particularly that of the aurora. The interval between the two grand maxima of 1788 and 1839 is fifty-one years; between those of 1730 and 1788 is fifty-eight years. The average of the two intervals is fifty-four and one-half years. If the year 1848 is substituted for the year 1839 as that of the last great maximum, the first interval will be increased to sixty years and the mean of the first and second to fifty-nine years. Although Wolf considers the coincidences just mentioned between the spots and the aurora as proving the *cosmical* origin of the latter, he objects to the theory of Mairan and Olmsted, which would associate it with the zodiacal light and meteors, that such years as 533, 763, 1096, 1766, 1799, 1833–4, which swarmed with shooting-stars, are in no way remarkable for auroras. The secular period of the meteors is only 33–4 years. However, five of these periods contain about the same number of years as three of the secular periods of the aurora.

Wolf draws a secular curve for the aurora which he calls the European curve.

[1] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich. VI. 190, 1.

[2] Monthly Notices of the London Astronomical Society, XX. 282.

The exclusion of the observations gathered in Arctic expeditions makes the anomalous maximum of the year 1821 disappear from this curve. He then draws another curve from the Swiss observations alone, which he thinks conforms still more exactly to the secular curve of the solar spots. He quotes the Swiss Chronicles of Vogel to the effect that in the year 677 the aurora was seen in that country for ten successive nights: so extraordinary an event for that locality that Wolf thinks there can be no doubt that that year was one of the grand maxima. Also, between the years 1560 and 1583 the aurora was seen very frequently. The whole interval between the years 1788 and 1568 contains four periods of fifty-five years and twenty periods of eleven years each. The whole interval between the years 1568 and 677 contains sixteen intervals of 55.69 years, and eighty intervals of 11.14 years each. The long interval between 1788 and 677 contains twenty intervals of 55.55 years, and one hundred intervals of 11.11 years. On the other hand, Olmsted's period of 65 years would introduce a minimum instead of a maximum into the year 1568. As Wolf's period is about six-sevenths of Olmsted's period, the two will concur in making the same year a maximum once in about three hundred and ninety years; for example, in the years 1788 and 1398. Fritz[1] argues for another grand maximum in the year 1505 or 1516: but the evidence is far from being conclusive.

After Fritz[2] had extended his catalogue of auroras to eighty-four hundred he arranged them in three separate groups according to the geographical position of the observer, and then compared the number for each year between 1824 and 1861 with Wolf's relative numbers of solar spots. Though a general parallelism between the two phenomena prevailed, the alternations in the aurora lagged behind the corresponding ones in the solar spots. As soon as Fritz's[3] catalogue of auroras had reached ninety-five hundred, embracing 40000 observations, he again made a table of comparisons between the number of auroras in each year and the relative number of solar spots, extending the comparison to the interval between the years 1700 and 1861: and making it, not only for the observations in the aggregate, but also separately for the auroras observed in distinct zones of latitude. He finally settles down upon the years 1730, 1788, and 1848, as those of the grand maxima, and the years 1700, 1758 or 1766, and 1811 or 1812, as the years of the grand minima. The secondary maxima and minima which he deduces from those series of observations which he considers most complete are exhibited in Table LVI..

[1] Vierteljahrsschrift der Naturforsch. Gessellsch. in Zürich. X. 162.

[2] Vierteljahrsschrift der Naturforsch. Gessellsch. in Zürich. IX. 122

[3] Vierteljahrsschrift der Naturforsch. Gessellsch. in Zürich. X. 232–5.

TABLE LVI.

Maximum.	Mean.	Period.	Spot Maximum.	Minimum.	Mean.	Period.	Spot Minimum.
1707	1707		1706	1700			1698
1719–23	1721	14.00	1718	1714		14.00	1712
1726–30	1728	7.00	1728	1724		10.00	1723
1735–41	1738	10.00	1739	1733		9.00	1733
1747–52	1749	11.00	1750	1745		12.00	1745
1759–61	1760	11.00	1761	1758		13.00	1755
	1769[1]	9.00	1770	1766		8.00	1766
	1779	10.00	1779	1776		10.00	1776
	1788	9.00	1788	1785		9.00	1785
1802–5	1804	16.00	1804	1796		11.00	1799
1814–19	1816	12.00	1817	1811		15.00	1811
1829 or	1830	14.00	1830	1823		12.00	1823
1837–41	1839	9.00	1837	1834		11.00	1834
	1848	9.00	1848	1842		8.00	1844
	1859	11.00	1860	1856		14.00	1856
		10.90				11.14	

Adopting 55.6 years as the mean secular period, and moving backward from the year 1788, Fritz calculates the average years of the earlier grand maxima, and then compares them with Mairan's *Reprises*, which were deduced from old recorded observations. The results are given in Table LVII.

TABLE LVII.

No.	Mairan.	Fritz.	Period.	No.	Mairan.	Fritz.	Period.
1	400	399		12	1157	1177	
2	450	455	56	13	1351	1344	167
3	502	511	56	14	1461–65	1455	111
4	560–600	566	55	15	1520	1511	56
5	770–75	788	222	16	1554		
6	859	844	56	17	1560–64		
7	900	899	55	18	1574–75	1566	55
8	990	1011	112	19	1621	1622	56
9	1039	1066	55	20	1686	1677	55
10	1098–1104			21	1707–10		
11	1116	1122	56	22	1716–32	1733	56

After confessing and explaining away, as far as possible, some discrepancies and inconsistencies revealed by these comparisons, Fritz concludes with the following proposition:—

"Dass für das mittlere Europa das Nordlicht eine periodische Erscheinung ist, deren Perioden einer mittleren Länge von 55.6 Jahren entsprechen, welche in ihren Stärken jedoch wieder grösseren Perioden unterworfen sind; dass die grösseren Perioden von 55.6 Jahren wieder in untergeordnete von etwa 11.11 Jahren zerfallen, und dass

[1] Mit einer nachfolgenden Erhöhung von 1774, so dass man in Mittel auf 1771 käme, p. 241.

endlich das Nordlicht in einem innigen Zusammenhange und parallalen Gange mit der Sonnenfleckenbildung steht und zwar in der Weise, dass zur Zeit der reichsten Fleckenbildung das Nordlicht am häufigsten auftritt und umgekehrt die Minima Zusammenstimmen und dass, während bei den Sonnenflecken die Hauptmaxima sich weniger auszeichnen, dies bei den Nordlichtern weit entschiedener der Fall ist[1]."

Herschel[2] pays a just tribute to the magnitude and the value of these researches of Wolf and Fritz and recognizes the fact that the secular period of fifty-six years suits the observations upon the aurora better than that of sixty-five years.

If the isochronism supposed to exist between the disturbances of the sun's atmosphere, the fluctuations of terrestrial magnetism, and the displays of the aurora were satisfactorily demonstrated, the question naturally arises which of the three is cause and which is effect, or whether all three are not independent effects of some general cause. The spots upon the sun have been called mirrors in which the reflex influence of the planets upon that luminary could be seen. An English writer, Grey, has said that he called upon a friend to ascertain by computation whether there was any period in the movements or conjunctions of the heavenly bodies which could throw light on the eleven-year period of the solar spots. His friend responded that Mercury and Venus would come into conjunction with each other on the same side of the sun once in every 11.08 years.[3] Reichenbach has alluded to the fact that Jupiter's period is nearly equal to the spot period, and that the maxima of solar disturbance approximate to the times of Jupiter's passage through the aphelion.[4]

If there is an annual periodicity in the frequency of the sun's spots, suggesting the earth's variable action upon the sun at different seasons of the year, may not the other planets also exert a similar influence. Wolf has asked and answered this question. Expressing the comparative influence of a planet over the sun by $\frac{m}{r^2}$, he computes the following weights as exponents of the activity of the most important planets in this direction: —

Mercury = 0.47	Mars = 0.06	Uranus = 0.04
Venus = 1.68	Jupiter = 12.53	Neptune = 0.04
Earth = 1.00	Saturn = 1.12	

The ordinate of the curve which represents the disturbance produced upon the sun's surface by these planets is calculated by this formula: —

$$M = A + B\,(1.68 \sin. 585°.26t + 1.00 \sin. 360°t + 12.53 \sin. 30°.35t + 1.12 \sin. 12°.22t).$$

[1] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich. X. 258.
[2] The Quarterly Journal of Science. I. 229. [3] Phil. Mag. Fourth Series, XX. 246 and 271.
[4] Amer. Journ. Sci. Second Series, XXV. 296.

The constants A and B are computed by the method of least squares and found to be 50.31 and 3.73. This formula gives results which exhibit a rough agreement with the relative number of solar spots observed between the years 1836 and 1839, but the discrepancies between the conclusions of theory and observation, which are great indeed for the whole interval between 1850 and 1858, are enormous in the years 1834 and 1835. The period of Jupiter, which is 11.86 years, enters largely into the calculated disturbance, but this alone fails to explain satisfactorily the periodicity of the solar spots, the duration of which is 11.11 years. It is intimated by Wolf that the *tropical* revolution of Jupiter may possibly match the period of the solar spots exactly, since the great oblateness of that planet must produce a large amount of precession in the equinoxes. But he decides that the observations of the sun's spots are better satisfied by his period of 11.11 years than they can be by Jupiter's period of 11.86 years, or Lamont's period of 10.43 years; the first period being nearly the mean of the two other periods.[1]

The term in the formula which comes next in importance to that of Jupiter is one depending on the mass and distance of Venus from the sun. The period of this term is 7.65 months; and it causes, as Wolf supposes, the subordinate swell in the annual curve of solar spot frequency, the period of which is about .637 of a year. If the solar spots are in any way associated with the aurora, this almost semi-annual period may correspond to that portion of the second terms, in the formulas given on page 211 of this memoir, which cannot be explained by differences in the duration of daylight.

De la Rue[2] has endeavored to obtain evidence of planetary influence on the behavior of the solar spots by measuring their area under different exposures. He finds changes depending on the variable configuration of the heavens, Jupiter exercising a great though not a predominating influence. The period of about twenty months which he deduces from the observations, points to Venus as the most influential planet, this period being not unlike the time of the synodical revolution of this planet.

The possible dependence of the spot-periods on the united influence of all the planets has been discussed by Schmidt[3] with this result, — that the periods of maxima concur with the times when the centre of gravity of the solar system is in the surface of the sun, and the periods of minima with the times when the centre of

1 Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, II. 353, IV. 73 and X. 151.

2 Researches in Solar Physics, Second Series, p. 42, 3.

3 Resultate aus eilfjährrigen Beobacht. neber Sternschnuppen.

gravity is farthest removed from the surface, either inwards or outwards. Peters[1] refutes the proposition, by introducing Neptune into the account in calculating the position of the centre of gravity.

Dove has found traces of a decimal period in the fluctuations of the mean annual temperature of the earth.[2] Kluge deduces from his own investigations the conclusion that a period of about 11.11 years governs the frequency of volcanic eruptions and earthquakes, but in such a way that the minima of these outbreaks occur in years most distinguished by an abundance of solar spots and frequent magnetic disturbances.[3]

1 Astronomische Nachrichten. 2 London Athenæum for 1866, p. 236.
3 Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, IX. 266 and X. 252.

SECOND GENERAL CATALOGUE OF AURORAS.

B. C.				
434.			Short.[1]	
176.			Short.	
159.			Short.	
87.			Short.	
84.			Short.	
A. D.				
551?			*Westminster.*	Matthew, Pensey.[2]
590.			Short.[3]	
610.	Oct.	20.	*China.*	
793.			Short.	
905.	April	12.		
978.			Short.	
992.	Oct.	26.	*Zurich?*	Vogel, Wolf.[4]
1097.			Maier, Frobes ?[5]	
1117.	Feb.	17.	*Einsiedeln.*	Kuhn.[6]
1122.			Short.	

1 A General Chronological History of the Air, Weather, &c. II. 178.
2 Annals of Philosophy, IX. 250.
3 The Aurora was seen on three nights.
Vierteljahrsschrift der Naturforsch. Gesellsch. in Zurich, II. 83 and 401.
5 Robert Monachi Historia Hierosol. Lib. V. Comm. Acad. Scient. Petrop, 1726, I. 366.
6 Vierteljahrsschrift der Naturforsch. Gesellsch. in Zurich, XI. 112. If this date is in old style, the Aurora may be the same as that of Feb. 22.

1128.	Nov.	25.	*Bohemia?*	Strnadt.[1]
1130.	Jan.	13.	*Bohemia?*	Strnadt.
"	Sept.	2.	*Bohemia?*	Strnadt.
"	Oct.	8.	*Bohemia?*	Strnadt.
1132.	Jan.	21.	*Bohemia?*	Strnadt.
1138.	May	18.	*Bohemia?*	Strnadt.
"	Oct.	13.	*Bohemia?*	Strnadt.
"	"	14.	*Bohemia?*	Strnadt.
1139.	March	14.	*Bohemia?*	Strnadt.
1177.	Nov.		Short.	
"	Dec.		Short.	
1189.			Short.	
1193.			*England.*[2]	
1194.			*England.*	
1347.			Short.	
1460.	Jan.	13.	*Bohemia?*	Strnadt.
1560.	Dec.	28.	*Mark, Brandenburg.*	Beckmann.
1562.	March	23.	Rauner.[4]	
1564.			Short.	
"	Feb.	15.	*Scotland.*[5]	
"	"	18.	*Scotland.*	

1 Chronolog. Verzeichn. d. Naturgebenhen in Böhmen.
2 Neubrigensis Chronica Rerum Anglicarum, IV. 36.
3 Wochenschrift für Astronomie, Meteorologie, &c. Neue Folge, VII. 230.
4 Wolf quotes Chasma Coeli, Erffurdt.
5 Burton, in his History of Scotland, refers to Knox's History, II. 417.

1571.	Aug.	4.	*London.*[1]
1572.	Jan.	28.	*Bohemia?* Strnadt.
1574.			Short.
1575.			*Vindemia.* Maier, Frobes.[2]
*1575.	Oct.	8.	*Aarberg.* Lüthardt, Wolf.[3]
1603.	Feb.	7.	*Bohemia?* Strnadt.
"	March	13.	*Meyenfeld.* Basler, Wolf.
"	Aug.	6.	*Zurich?* Vogel, Wolf.
1604.	Dec.	7.	*Meyenfeld?* Basler, Wolf.
"	"	19.	*Bohemia?* Strnadt.
1607.	Feb.	23.	*Zurich?* Vogel, Wolf.
*1621.	Feb.	3.	Mairan, Wolf.[4]
* "	Sept.	12.	*Zurich, &c.* Basler, Wolf.[5]
1637.			*Aix.* Gassendus, Frobes.
"			*Occitania.* Duhamel.[6]
1646.	Feb.	6.	*Mark.* Beckmann.
1658.	Oct.	13.	*Mark.* Beckmann.
1678.	Oct.	29.	*Mark.* Beckmann.
1680.	May	31.	Kirch,[7] Wolf.
*1704.	Dec.	28.	*Copenhagen.* Happel.[8]
*1707.	Feb.	12.	*Copenhagen.* Römer,[9] Liebknecht.
* "	"	12.	Wollfius, Weidler, Reuss.
* "	March	17.	*Schomberg.* Seidelius.
* "	"	17.	*Copenhagen.* Römer.
* "	"	18.	*Berlin.* Kirch, Leibnitz.[10]
* "	"	20.	*Tornea, Bothnia.* Scheller.
* "	Aug.	16.	*Breslau.* Happel.
"	"	17?	*Breslau.* Happel.
* "	Oct.	27.	*Tornea, Bothnia.* Scheller.[11]
* "	Nov.	24.	*Tornea, Bothnia.* Scheller.
* "	"	27.	Reuss.
*1708.	Aug.	20.	Thompson and Pilgram.
*1708.	Aug.	21.	Thompson.
* "	Sept.	15.	Pilgram.
* "	Sept.	22.	*Leipsic, Naumburg, and Zeitz.*
* "	"	22.	*Jena and Halle.* Wollfius.[1]
*1709.	Oct.	18.	*Durham, England.*
* "	Dec.	19.	*Marienburg, Prussia.*
1710.	May	29.	*Leeds.* Thoresby.[2]
* "	Dec.	7.	*Giessen.* Liebknecht.[3]
*1711.	March	*x.*	*Brisach.* Frobes.[4]
*1714.	Oct.	15.	*Berne.* Frobes. [Probably a meteor].
1716.	Feb.	*x.*	*Upsal.* Frobes.[5] [Omitted by Mairan.]
"	March	16.	*Mark.* Beckmann, Wolf.
* "	"	17.	*Norcöping.* Oxelgren.[6]
* "	"	17.	Reuss, Pilgram.
* "	"	17.	*Prussia.* Pater.
* "	"	17.	*Leipsic.* Gemynius.[7]
* "	"	17.	*Helmstädt.* Wagner
* "	"	17.	*Brunswick.*[8]
* "	"	17.	*Halberstadt, Halle.*
* "	"	17.	*Saxony.* Wollfius.
* "	"	17.	*Lomme.* Schmidems.
* "	"	17.	*Eisleben.* Boetticherus.
* "	"	17.	*Giessen, Hessen.* Liekbknecht.
* "	"	17.	*France and G. Britain.*
* "	"	17.	Weidler.
"	March	24.	*Switzerland?* Scheuchzer. Wolf.[9]
* "	April	11.	*Paris.* Cassini, Reuss.
* "	"	12.	*Paris.* Cassini.
* "	"	13.	*Paris.* Weidler.[10]
* "	May	1.	*Giessen.* Liebknecht. Reuss.[11]
* "	"	2.	*Giessen.* Liebknecht.[12]

[1] "—the Londoners were in the streets gazing at a huge arch in the sky, which seemed to span the city, and filled their hearts with terrors of approaching change."—Fronde's History of England, X. 258.

[2] He quotes Marcellus Squarcialupus.

[3] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, I. 197, V. 327.

[4] Wolf quotes Mairan, and Mairan quotes Kirch. Is this not the Aurora of March 3? Compare Mairan.

[5] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, IV. 389.

[6] Opera Philos. Tom. I. Lib. de Meteoris L. I. Cap. IV. p. 327.

[7] Wolf quotes Neue Himmelszeitung.

[8] Denckwurdigkeiten der Welt.

[9] Miscellan. Berolin, I. 131, 133, et 135.

[10] Comment. Hist. Acad. Reg. Scient. Paris, 1707.

[11] Disput. de Chasmate sive Aurora Boreali, p. 18.

[1] Acta Erudit. Lips. 1708, p. 526.

[2] Phil. Trans. XXVII. 322. It is doubtful whether this was an aurora, though Thompson so regards it in his Meteorology.

[3] Acta Erudit. Lips. 1711, p. 325.

[4] Acta Phys. Med. Artific. Litt. Uratislav. 1717, I. 165.

[5] Acta Litt. Sueciae, I. 568.

[6] Celsius, Observ. de Lumine Boreali, p. 1.

[7] Kurze Bescreibung der Neuen Wunder-Erscheinung des Nord-Lichts, &c.

[8] Acta Erudit. Lips. 1716 pp. 357, 361, and 365.

[9] Naturhistorie des Schweizerlandes.

[10] Mém. de l'Acad. Paris, 1716, p. 122.

[11] Was not this a meteor?

[12] Syrmatum et Coruscationum Borealium in Horizonte Gisseno observ. Descriptio.

*1716.	May	3.	*Giessen.*	Liebknecht.
* "	"	4.	*Giessen.*	Liebknecht.
* "	"	5.	*Giessen.*	Liebknecht.
* "	Dec.	15.	*Paris.*	Maraldi, Reuss.
* "	"	16.	*Paris.*	Maraldi, Reuss.
*1717.	Feb.	16.	Reuss.	[Also Jan. 6,9,10,and 11.]
* "	April	6.	*Paris.*	Maraldi.
* "	"	9.	*Paris.*	Maraldi, Reuss.
* "	"	10.	*Paris.*	Maraldi, Reuss, Weidler.[1]
* "	"	11.	*Paris.*	Maraldi, Reuss.
* "	Aug.	21.	*Silesia and Lusatia.*	Fisher.[2]
* "	"	21.	*Polen, Prussia, and Hungary.*	
* "	"	21.	Gottschling.[3]	
* "	Sept.	20.	Reuss.	
* "	Oct.	1.	*Upsal.*	Burman.[4]
*1718.	Feb.	5.	*Marseilles.*	Gemynius.[5]
* "	"	14.	*Schyllberg, Nericia.*	Hiorter.
* "	March	4.	*Schyllberg.*	Hiorter, Reuss.
* "	"	4.	*Bohemia.*	Gemynius.[6]
* "	"	4.	*Copenhagen.*	
* "	"	4.	*Mark.*	Beckmann, Wolf.
* "	"	15.	*Silesia and Prussia.*	Frobes.
* "	"	18.	*Schyllberg.*	Hiorter.
* "	"	19.	*Mark.*	Beckmann, Wolf.
* "	"	21.	*Zurich.*	Kirch.
* "	"	22.	*Zurich.*	Kirch.
* "	April	2.	*Bohemia?*	Frobes.
* "	May	11.	*St. Martin, Antillas.*[7]	Frobes.
* "	June	8.	*Ohlau.*	Frobes.
* "	Aug.	28.	*Schyllberg.*	Hiorter.
* "	Sept.	16.	*Schyllberg.*	Hiorter, Reuss.
* "	"	16.	*Mark.*	Beckmann, Wolf.
* "	Oct.	11.	*Schyllberg.*	Hiorter.
* "	"	23.	Reuss.	
* "	"	27.	*Schyllberg.*	Hiorter.
* "	Nov.	2.	*Reichstadt, Bohemia.*	Rost.
* "	"	23.	*Mark.*	Beckmann, Wolf.
* "	Dec.	17.	*Silesia.*	
* "	"	18.	*Schyllberg.*	Hiorter.
* "	"	30.	*Schyllberg.*	Hiorter.
* "	"	31.	*Germany.*	Frobes.

[1] Acta Erudit. Leipsic, 1717, p. 270, 1721, p. 188.

[2] De Insolito quodam Phoenomeno Kesmarkini &c. viso.

[3] Meteorologia Sacra.

[4] Acta Litt. Sueciae, I. 566.

[5] Gedancken uber den zu Leipsic, &c., entstandenen Nordschein.

[6] Acta Uratislav. 1718, p. 670.

[7] Acta Phys. Uratislav. 1718, p. 810, 999, 1077, and 1961.

*1719.	Feb.	23.	*Marseilles.*	Hermann.[1]
* "	March	5.	*Switzerland.*	Scheuchzer.
* "	"	5.	*Bohemia, Silesia, Saxony.*	
* "	"	5.	*Franconia, Schwabia, Italy.*	
* "	"	6.	*Marseilles.*	Hermann.
* "	"	30.	Whiston, Reuss.[2]	
* "	April	9.	*England, Belgium.*	
* "	"	9.	*France.*	Frobes.
* "	"	10.	*England, Belgium.*	
* "	"	10.	*France.*	Frobes.
* "	"	18.	*Paris.*	Frobes.[3]
* "	Sept.	25.	*Lithuania.*	Frobes.
* "	Oct.	27.	*Berlin and Magdburg.*	Frobes
* "	"	30.	*Bohemia and Silesia.*	Frobes.
* "	Nov.	*x.*	*Appenzell.*	Scheuchzer.[4]
* "	"	14.	*Reichstadt, Bohemia.*	Frobes.
* "	"	17.	*Marseilles.*	Frobes.
* "	"	21.	Reuss.	
* "	"	22.	*Madgburg.*	Frobes.
* "	"	24.	*Bohemia, Silesia, Saxony.*	
* "	"	24.	*Marchia.*	
* "	Dec.	1.	*Magdburg.*	Frobes.
"	"	2.	Frobes, Halley, Weidler.[5]	
* "	"	22.	Reuss.	
*1720.	Jan.	1.	*Gothia, Sweden.*	Gardell.
* "	"	1.	Celsius.	
* "	Feb.	6.	*Paris.*	Maraldi, Louville, Reuss.[6]
* "	"	6.	*Mark.*	Beckmann.
* "	"	10.	*Paris.*	Maraldi, Reuss.
* "	"	10.	*Mark.*	Beckmann.
* "	"	11.	*Paris.*	Maraldi, Reuss.
"	"	18.	*Mark.*	Beckmann.
* "	"	22.	*Lützen.*[7]	
* "	"	26.	*Berlin.*	Kirch.[8]
* "	March	9.	Reuss.	
* "	Nov.	29.	*Marseilles.*	Frobes, Reuss.
* "	Dec.	2.	*Corsica.*	Frobes.
"	"	6.	*Saxony, Lusatia, and Polonia.*	
* "	"	28.	Reuss.	

[1] Acta Uratislav. 1719, p. 177, 316.

[2] Acta Erudit. Leipsic, 1720, p. 218.

[3] Acta Erudit. Leipsic, VIII. 465, Suppl. II. 55, 338.

[4] Frobes thinks this appearance may have been a fragment of a parhelion.

[5] Aurora Australis.

[6] Acta Erudit. Leipsic, 1727, p. 499.

[7] In the original *Lucinum.*

[8] Acta Uratislav. 1720, Pt. I. p. 184, Pt. II. p. 450. etc.

1721.	Jan.	1.	Heis.[1]	
*	"	Feb.	17.	*France.* Maraldi, Reuss.
*	"	"	17.	*Germany.* Liebknecht.[2]
*	"	"	23.	*France.* Maraldi.
*	"	"	23.	*Germany.* Leibknecht.
*	"	"	28.	*France.* Miraldi, Heis.
*	"	"	28.	*Germany.* Liebknecht.
*	"	March	1.	*Mark.* Beckmann.
*	"	"	12.	*Germany.* Kulm, etc.
*	"	"	12.	*Wittemberg.* Hallmann.[3]
*	"	"	29.	*Stuttgart.* Frobes.[4]
*	"	Oct.	3.	*Magdburg, Nuremberg.* Rost.
*	"	"	23.	*Lützen,*[5] *Dresden, Poland.*
*	"	"	24.	*Lützen, Dresden, Poland.*
*	"	"	31.	*Nuremberg.*
*	"	Nov.	1.	*Magdburg, Nuremberg.* Rost.
*1722.	Jan.	22.	*Nuremberg.* Rost.[6]	
*	"	"	23.	*Nuremberg.* Rost.
*	"	"	25.	*Nuremberg and Breslau.*
*	"	Feb.	23.	*Seehausen.* Siegesbeck.[6]
*	"	"	24.	*Seehausen.* Siegesbeck.
*	"	"	27.	*Seehausen.* Siegesbeck.
*	"	March	17.	*Angerburg.* Frobes.
*	"	"	18.	*Breslau.* Frobes.
*	"	"	27.	*Nuremberg.* Rost?
*	"	April	5.	*Seehausen, Dresden.* Frobes.
*	"	May	23.	*Lobau.* Frobes.
*	"	June	4.	*Jauer.* Frobes.
*	"	Sept.	16.	*Saxony.* Frobes.
*	"	"	17.	*Seehausen.* Siegesbeck. *Saxony.*
*	"	"	18.	*Seehausen.* Siegesbeck.
*	"	Oct.	14.	*Seehausen.* Siegesbeck. *Dresden.*
*	"	"	19.	*Seehausen.* Siegesbeck.
*	"	"	20.	*Seehausen.* Siegesbeck.
*	"	"	21.	*Seehausen.* Siegesbeck.
*	"	"	25.	*Seehausen.* Siegesbeck.
*	"	"	26.	*Seehausen.* Siegesbeck.
*	"	Nov.	14.	*Seehausen.* Siegesbeck.
*	"	"	22.	*Giessen.* Liebknecht.[7]
*	"	"	23.	*Dresden.* Frobes.
*	"	"	24.	*Dresden.* Frobes.
*1722.	Dec.	3.	*Dantzig.* Kulm.	
*	"	"	12.	*Dresden.* Frobes.
*	"	"	15.	*Seehausen.* Siegesbeck.
*	"	"	31.	Pilgram.
*1723.	Jan.	12.	*Nuremberg.*	
*	"	"	14.	*Seehausen.* Siegesbeck.
	"	"	17.	*Portugal.* Frobes.[1]
*	"	March	10.	*Giessen.* Frobes.[2]
*	"	"	21.	*Breslau.* Frobes.
*	"	Sept.	7.	*Jauer.* Frobes.
*	"	"	12.	*Jauer.* Frobes.
*	"	"	28.	*Jauer.* Frobes.
*	"	Oct.	31.	*Lusatia, Saxony.* Frobes.
*	"	Dec.	18.	*Jauer.* Frobes.
*	"	Jan.	17.	*Germany, Poland, Italy, France.*[3]
*	"	"	29.	*Germany, Poland, Italy, France.*
*	"	"	30.	*Germany, Poland, Italy, France.*
*	"	March	24.	*Germany, Poland, Italy, France.*
*	"	May	4.	*Germany, Poland, Italy, France.*
*	"	"	22.	*Germany, Poland, Italy, France.*
*	"	Aug.	4.	*Germany, Poland, Italy, France.*
*	"	"	12.	*Germany, Poland, Italy, France.*
*	"	"	17.	*Germany, Poland, Italy, France.*
*	"	"	24.	*Germany, Poland, Italy, France.*
*	"	"	31.	*Germany, Poland, Italy, France.*
*	"	Sept.	9.	*Germany, Poland, Italy, France.*
*	"	"	22.	*Germany, Poland, Italy, France.*
*	"	"	23.	*Germany, Poland, Italy, France.*
*	"	Dec.	25.	*Germany, Poland, Italy, France.*
*1725.	Jan.	8.	*Tornea.* Burman.	
*	"	"	8.	*Germany.* Frobes.
*	"	"	9.	*Germany.* Frobes.
*	"	"	12.	*Germany.* Frobes.
*	"	"	13.	*Germany.* Frobes.
*	"	Feb.	6.	*Upsal.* Burman.[4]
*	"	"	9.	*Upsal.* Burman.
*	"	"	11.	*Upsal.* Burman.
*	"	Oct.	5.	*Germany.* Frobes.
*	"	"	7.	*Germany.* Frobes.
*	"	"	8.	*Germany.* Frobes.
*	"	"	9.	*Germany.* Frobes.
*	"	Dec.	5.	*Germany.* Frobes.
*	"	"	6.	*Germany.* Frobes.
	"	"	7.	*Germany.* Frobes.

[1] Wochenscrift für Astronomie, Meteorologie, etc., Neue Folge, II. 294.
[2] Acta Erudit. Leipsic. 1721, p. 157, etc.
[3] Gott. Gelehr. Zeit. 1721 pp. 710–33.
[4] Acta Uratislav. 1721, p. 177, 302, etc.
[5] Luzinensibus, or inhabitants of Lützen.
[6] Acta Uratislav. 1722, Pt. I. p. 49, etc.
[7] Novellae Litter. Lips. 1723, p. 220.

[1] Uratislav. 1723, p. 71, and Suppl. II. 57. This aurora is not given by Mairan. Perhaps it was a meteor.
[2] Novellae Litter. Lips. 1723, p. 220.
[3] Acta Uratislav. 1724, p. 70, etc.
[4] Acta. Lit. Sueciae, II. 141.

*1725.	Dec.	8.	*Germany.*	Frobes.
1726.	Jan.	4.	Reuss.	[Old Style?]
* "	Feb.	7.	*Germany.*	Frobes.
"	March	17.	*Coast of Spain.*	Rico.[1]
"	"	31.	Reuss.	[Old Style?]
* "	"	24.	*Germany.*	Frobes.
* "	Sept.	5.	*Germany.*	Frobes.
* "	"	28.	*Germany.*	Frobes.
"	Oct.	7.	Reuss.	
"	"	9.	*Mark.*[2]	Beckmann.
* "	"	14.	Pilgram.	
* "	"	15.	Pilgram.	
* "	"	19.	*Spain.*	Rico, Reuss, Pilgram.
* "	"	19.	*Helmstadt, Germany.*	Frobes.
* "	"	19.	*Poland, Switzerland.*	
* "	"	19.	*France, England.*	
* "	"	20.	*Germany.*	Frobes.
* "	"	21.	*Germany.*	Frobes.
* "	Nov.	4.	*Lund, Sweden.*	Frobes.
* "	Dec.	1.	*Germany.*	Frobes.
* "	"	18.	*Germany.*	Frobes.
*1727.	Jan.	15.	*Germany.*	Frobes.
* "	March	14.	*Germany.*	Frobes.
* "	"	15.	*Germany.*	Frobes.
* "	April	8.	*Germany.*	Frobes.
* "	"	14.	*Germany.*	Frobes.
* "	Aug.	1.	*Germany.*	Frobes.
* "	Sept.	22.	*Germany.*	Frobes.
* "	Oct.	13.	*Germany.*	Frobes.
* "	"	14.	*Germany.*	Frobes.
* "	"	17.	*Germany.*	Frobes.
* "	"	17.	*Italy.*	Manfredi.
* "	"	19.	*Germany.*	Frobes.
* "	"	20.	*Germany.*	Frobes.
* "	"	23.	*Cola.*	Croyere.
* "	Nov.	6.	*Germany.*	Frobes.
*1728.	Feb.	9.	*Kesmark, Hungary.*	Buchholz.
* "	"	9.	*Germany.*	Trautmann.
* "	"	9.	*Seehausen.*	Siegesbeck.
* "	"	9.	*Dantzig.*	Kulm.
* "	"	9.	*Nuremberg.*	Rost.
* "	"	9.	*Helmstadt.*	Frobes.
* "	"	9.	*Utrecht.*	Musschenbroek.
* "	"	13.	*Hudiksvall.*	Bromann.
* "	"	26.	*Germany.*	Frobes.[3]

[1] Mem. Acad. Ciencias Madrid, III. 77.

[2] The aurora was seen at Mark in 1728 seventeen times.

[3] Those auroras seen in Germany this year were seen as specified for Feb. 9.

*1728.	Feb.	29.	*Germany.*	Frobes.
* "	March	26.	*England.*	Buechner.[1]
* "	"	27.	*England.*	Buechner.
* "	"	29.	*Germany.*	Frobes.
* "	April	2.	*Germany.*	Frobes.
* "	"	4.	*Germany.*	Frobes.
* "	June	7.	*Germany.*	Frobes.
* "	"	25.	*Germany.*	Frobes.
"	July	28.	*Plymouth.*	Huxham.
* "	Aug.	30.	*Germany.*	Frobes.
* "	"	30.	*Löbau.*	Wehr.[2]
* "	Sept.	27.	*Russia.*	Frobes.[3]
* "	"	29.	*Germany.*	Frobes.
* "	Oct.	2.	*Germany.*	Frobes. Reuss.
* "	"	2.	*Utrecht.*	Musschenbroek.[4]
* "	"	2.	*Löbau.*	Wehr.
* "	"	4.	*Germany.*	Frobes.
* "	"	7.	*Germany.*	Frobes.
* "	"	24.	Reuss.	[Old Style?]
* "	Nov.	2.	*Germany.*	Frobes.
* "	"	8.	*Germany.*	Frobes.
* "	Dec.	4.	*Germany.*	Frobes.
* "	"	14.	*Germany.*	Frobes.
*1729.	Jan.	17.	*Germany.*	Frobes.[5]
* "	"	20.	*Germany.*	Frobes.
* "	"	24.	*Germany.*	Frobes.
* "	Feb.	16.	*Germany.*	Frobes.
* "	"	17.	*Germany.*	Frobes.
* "	March	2.	*Germany.*	Frobes.
* "	"	27.	*Germany.*	Frobes.
* "	April	6.	*Germany.*	Frobes.
* "	"	19.	*Germany.*	Frobes.
* "	"	30.	*Germany.*	Frobes.
* "	May	1.	*Germany.*	Frobes.
* "	"	22.	*Germany.*	Frobes.
* "	"	29.	*Paris.*	Maraldi. *Löbau.* Wehr.
* "	"	31.	*Germany.*	Frobes.
* "	June	15.	*Paris.*	Maraldi.
* "	"	26.	*Paris.*	Maraldi.
* "	Aug.	29.	Kraft.	
* "	Sept.	15.	*Paris.*	Maraldi.
* "	"	22.	*Risinge, Sweden.*[6]	Laurel.
* "	Oct.	11.	*Germany.*	Frobes.

[1] Miscellan. Phys. Medic. Math. 1728, p. 924, etc.

[2] Gilbert. Annalen der Physik, XXXII. 336, etc.

[3] Comment. Petrop. IV. 121.

[4] Tabula Meteorologica, 1728.

[5] Büchner. Miscell. Phys. Med. Math. 1729, pp. 40, 100, etc.

[6] Parish near Nincoping.

*1729.	Oct.	13.	*Paris.* Maraldi.	
* "	"	17.	*Germany.* Frobes.	
* "	"	24.	*Germany.* Frobes.	
* "	Nov.	16.	*Germany.* Frobes. Reuss.	
* "	"	16.	*Paris.* Maraldi. *Risinge.* Laurel.	
* "	"	16.	*Hudiksvall.* Bromann.	
* "	"	16.	*Lunda.* Quenselius.	
* "	Dec.	17.	*Germany.* Frobes.	
*1730.	Jan.	16.	*Germany.* Frobes.[1]	
* "	Feb.	7.	*Germany.* Frobes.	
* "	"	15.	*Germany.* Frobes.	
* "	"	15.	Reuss. Thompson.	
* "	"	16.	*Germany.* Frobes.	
* "	"	18.	*Germany.* Frobes.	
* "	March	6.	*Germany.* Frobes.	
* "	"	6.	*France.* Reuss.	
* "	"	9.	*Germany.* Frobes.	
* "	"	9.	*St. Petersburg.* Kraft.	
* "	"	17.	*Germany.* Frobes.	
* "	"	18.	*Germany.* Frobes.	
* "	April	12.	*Germany.* Frobes. *Lusatia.*	
* "	"	13.	*Germany.* Frobes.	
* "	"	20.	*Germany.* Frobes.	
* "	May	9.	*Germany.* Frobes.	
* "	June	21.	*Germany.* Frobes.	
* "	July	5.	*Germany.* Frobes.	
* "	"	6.	*Germany.* Frobes. *Löbau.*	
* "	"	17.	*Germany.* Frobes.	
* "	"	19.	*Germany.* Frobes.	
"	Aug.		*Siam.* Frobes.	
* "	Sept.	28.	*Germany.* Frobes.	
* "	"	30.	*Germany.* Frobes.	
* "	"	30.	*Risinge.* Laurel.	
* "	Oct.	4.	*Germany.* Frobes.	
* "	"	5.	*Germany.* Frobes.	
* "	"	6.	*Germany.* Frobes.	
* "	"	7.	*Germany.* Frobes.	
* "	"	9.	*Germany.* Frobes. *France.*	
* "	"	11.	*Germany.* Frobes.	
* "	"	20.	*Germany.* Frobes.	
* "	"	21.	*Germany.* Frobes.	
* "	"	22.	*Germany.* Frobes. Reuss.	
"	"	24.	Pilgram.	
* "	"	26.	*Germany.* Frobes.	
* "	Nov.	2.	*Mark.* Beckmann.	
* "	"	2.	*Germany.* Frobes. Pilgram.	
* "	"	3.	*France.* Frobes.	

[1] Buechner. Miscell. Phys. Med. Math. 1730, pp. 824, etc.

*1730.	Nov.	5.	*Germany.* Frobes. Pilgram.	
* "	"	7.	*Germany.* Frobes.	
* "	"	8.	*Germany.* Frobes.	
* "	"	19.	*Germany.* Frobes.	
* "	"	28.	*Germany.* Frobes.	
* "	Dec.	8.	*Germany.* Frobes.	
* "	"	17.	*Germany.* Frobes.	
* "	"	23.	*Germany.* Frobes.	
* "	"	26.	*Germany.* Frobes.	
* "	"	28.	*Germany.* Frobes.	
*1731.	Oct.	3.	*Helmstadt.* Frobes.	
* "	"	4.	*Helmstadt.* Frobes.	
* "	"	7.	*Hudiksvall, Sweden.*	
* "	"	7.	*Helmstadt.* Frobes.	
* "	"	8.	*Helmstadt.* Frobes. Thompson.	
* "	"	8.	*Mark.* Beckmann.	
* "	"	23.	*Helmstadt.* Frobes.	
* "	"	29.	*Helmstadt.* Frobes.	
* "	Nov.	11.	*Helmstadt.* Frobes.[1]	
*1732.	Jan.	3.	*Hudiksvall, Sweden.*	
* "	"	18.	*Hudiksvall, Sweden.*	
* "	Feb.	20.	*Germany.* Frobes.	
* "	"	21.	*Germany.* Frobes.	
* "	Mar.	14.	*Germany.* Frobes.	
* "	"	18.	*Germany.* Frobes.	
* "	"	21.	*Germany. Helmstadt.* Frobes.	
* "	"	22.	*Germany. Helmstadt.* Frobes.	
* "	"	28.	*Strengnesia, Hanestroem.*	
* "	"	28.	Ollonberg.	
* "	June	26.	*Germany. Helmstadt.* Frobes.	
* "	Aug.	22.	*Germany.* Frobes.	
* "	"	23.	*Germany. Coburg.* Frobes.	
* "	Sept.	10.	*Germany.* Frobes.	
* "	"	23.	*Germany.* Frobes.	
* "	"	24.	*Germany.* Frobes.	
* "	"	25.	*Germany.* Frobes.	
* "	"	26.	*Germany.* Frobes.	
* "	Oct.	23.	*Germany. Helmstadt.* Frobes.	
* "	Nov.	12.	*Germany.* Frobes.	
* "	"	20.	*Germany.* Frobes.	
"	Dec.	4.	Mairan.[2]	
*1733.	April	13.	*Silesia.* Frobes.[3]	
* "	July	7.	*Leipsic.* Gottsched.	
*1734.	Sept.	19.	*Altorf.* Kelschius.	

[1] Condamine, while making a journey from Cyprus to Constantinople, saw the aurora frequently in Sept. and Oct., 1731.

[2] Mém. de l'Acad. 1733, p. 478.

[3] Nova Litter. Lips. 1733, p. 291, etc.

	1735	March	2.	*Mark.* Beckmann.
*	"	"	13.	Baraterio.
*	"	"	15.	Baraterio.
*	"	"	22.	*Wittemberg.* Kraus.
*	"	"	24.	*Wittemberg.* Kraus.
*	"	"	24.	*London.* Bevis.[1]
*	"	"	24.	*Mark.* Beckmann.
*	"	April	22.	*Potsdam.* Frobes.
*	"	"	23.	*Mark.* Beckmann.
*	"	Sept.	25.	Reuss.
*	"	Oct.	15.	Reuss.
*	"	Nov.	18.	*Verden.* Trumphius.
*	"	Dec.	8.	*Verden.* Trumphius.
*	"	"	13.	*Verden.* Trumphius.
*	"	"	15.	*Verden.* Trumphius.
*	"	"	22.	Reuss.
	1736.[2]	Feb.	9.	*Mark.* Beckmann.
*	"	"	17.	Kelschius.
	"	March	21.	*Mark.* Beckmann.
*	"	April	5.	*Mark.* Beckmann.
*	"	Sept.	29.	*Mark.* Beckmann.
*	"	Oct.	7.	*Mark.* Beckmann.
*	"	"	20.	*Mark.* Beckmann.
*	"	"	22.	*Coburg.* Albrecht.
*	"	"	26.	*Coburg.* Albrecht.
*	"	"	26.	*Mark.* Beckmann.
*	"	"	27.	*Coburg.* Albrecht.
*	"	"	27.	*Mark.* Beckmann.
*	"	"	28.	*Coburg.* Albrecht.
*	"	"	28.	*Pomerania.* Burghart.
*	"	"	29.	*Coburg.* Albrecht.
*	"	"	30.	*Coburg.* Albrecht.
*	"	Nov.	24.	*Coburg.* Albrecht.
*	1737.	Aug.	20.	*Mark.* Beckmann.
*	"	"	23.	*Mark.* Beckmann.
*	"	Sept.	22.	*Mark.* Beckmann.
*	"	"	22.	*Goslar, Hanover.* Henning.
*	"	Oct.	23.	*Mark.* Beckmann.
	"	"	28.	*Siberia.* Gmelin.[3]
*	"	Nov.	12.	*Mark.* Beckmann.
	"	Dec.	5.	Phil. Trans. LXI. 371.
*	"	"	16.	*Helmstadt.* Frobes. Reuss.
*	1737.	Dec.	16.	*Italy.* Poleni.
*	"	"	28.	*Coburg.* Albrecht.
	"	"	30.	*Island Chiloe.* Paravey.[1]
	"	"	31.	*Spain.* Feijoo. Rico.
*	1739.	Jan.	27.	*Helmstadt.* Frobes.
*	"	Feb.	17.	*Helmstadt.* Frobes.
*	"	"	27.	*Mark.* Beckmann.
*	"	"	27.	*Helmstadt.* Frobes.
*	"	March	10.	*Helmstadt.* Frobes.
*	"	"	12.	*Helmstadt.* Frobes.
*	"	"	22.	*Helmstadt.* Frobes.
*	"	"	29.	*Helmstadt.* Frobes. Reuss.
*	"	"	29.	*Mark.* Beckmann.
*	"	May	1.	*Mark.* Beckmann.
*	"	June	2.	Reuss.
*	"	Sept.	24.	*Mark.* Beckmann.
*	"	Oct.	31.	*Mark.* Beckmann.
	1740.	Jan.	22.	*Mark.* Beckmann.
	"	Feb.	21.	*Mark.* Beckmann.
*	1741.	March	16.	*Mark.* Beckmann.
*	"	Aug.	10.	*Mark.* Beckmann.
*	"	Oct.	2.	*Mark.* Beckmann.
*	"	"	8.	*Mark.* Beckmann.
	1742.	Jan.	16.	*Upsal.* Fischer. Wolf.[2]
	"	"	29.	*Mark.* Beckmann.
	1746.	Oct.	29.	*Upsal.* Fischer.
	1747.	Dec.	16.	*Mark.* Beckmann.
*	1748.	Jan.	3.	*Mark.* Beckmann.
	1755.	"	6.	*Venice?* Zucconi. Wolf.[3]
	"	"	7.	*Venice.* Zucconi. Wolf.
*	1759.	Feb.	4.	*Berlin.* Acad. Coll.
	"	"	8.	*Paris.* Acad. Coll.[4]
*	"	April	5.	*Switzerland?* Vogel. Wolf.
*	1761.	Nov.	19.	*Switzerland?* Vogel. Wolf.
	1763.	Oct.	12.	*Warsaw, Poland.* Wolfe.[5]
*	1764.	March	4.	*London.*[6]
*	"	"	5.	*Oxford. Lisbon.*
	"	Oct.	23.	Bergmann. Wolf.[7]
*	1765.	"	12.	*Paris.* Messier. Wolf.[8]

[1] Phil. Trans. XLI. 347.

[2] In Wochenscrift für Astronomie etc., VII. 230, it is printed, evidently by mistake, 1739. The year 1741 is also printed for 1740, and 1737 and 1738 for 1747 and 1748.

[3] Reise durch Sibirien, 1733 bis 1743, II. 607.

[1] Pogg. Ann. der Physik un d ei. Chem Ergänzungsband IV. 76.

[2] Wolf quotes Geschichte der Physik etc., V.

[3] De Heliometri Structura. Venet. 1760.

[4] P. Etrang. VI. 649.

[5] Phil. Trans. LIV. 98.

[6] Phil. Trans. LIV. 326–8.

[7] Gilbert. Annalen der Physik, XV. 213.

[8] Connaiss. de Tems., 1806, p. 426.

*1768.	Aug.	6.	*Paris.* Messier.	
"	Sept.	19.	*Prince of Wales Fort.*[1]	
"	"	19.	*Hudson's Bay.*	
"	Oct.	5.	*Prince of Wales Fort.*	
"	"	5.	Dymond and Wales.	
"	"	12.	*Russia.* Pictet. Wolf.[2]	
* "	"	28.	*Paris.* Messier.[3]	
* "	"	28.	*Gurzelen.* Sprüngli.	
* "	"	28.	*Rome and Vienna.* Cotte.	
* "	Nov.	16.	*Prince of Wales Fort.*	
* "	"	16.	Dymond and Wales.	
"	"	20.	*Wardoe?* Littrow.[4] Wolf.	
* "	Dec.	5.	*Gürzelen.* Sprungli.	
* "	"	5.	*Vienna.* Cotte.[5]	
* "	"	5.	*Paris.* Messier.[6]	
1769.	Jan.	9.	*Russia.* Pictet. Wolf.[7]	
"	Feb.	2.	*Wardoe?* Littrow. Wolf.	
"	"	18.	*Nimbosero, Lapland.* Mallet.	
"	"	20.	*Wardoe?* Littrow. Wolf.[8]	
"	"	22.	*Kola, Lapland.* Mallet.	
"	"	22.	*Between Poria and Umbam.*	
"	"	22.	Pictet. Wolf.	
"	"	26.	*Paris.* Messier.[9]	
* "	"	27.	*Terski alio, Lapland.*	
* "	"	27.	Mallet. Wolf.	
* "	"	27.	*Umbam, Lapland.* Pictet.	
"	March	3.	*Umbam.* Pictet. Wolf.	
"	"	3.	*Ponoi.* Mallet.	
"	"	4.	*Umbam.* Pictet. Wolf.	
"	"	6.	*Umbam.* Pictet. Wolf.	
"	"	11.	*Umbam.* Pictet.	
"	"	12.	*Umbam.* Pictet. Wolf.	
"	"	22.	*Umbam.* Pictet. Wolf.	
"	"	23.	*Ponoi.* Mallet. Wolf.	
"	"	24.	*Ponoi.* Mallet. Wolf.	
"	"	25.	*Ponoi.* Mallet. Wolf.	
1769.	March	27.	*Umbam.* Pictet. Wolf.	
"	"	28.	*Ponoi.* Mallet. Wolf.	
"	"	30.	*Umbam.* Pictet. Wolf.	
"	June	3.	Littrow. Wolf.	
"	Sept.	2.	*Paris.* Messier. Wolf.[1]	
"	"	21.	*Oxford.* Parsons.[2]	
* "	"	26.	*Gurzelen.* Sprüngli.	
"	Oct.	2.	*Oxford.* Swinton.	
* "	"	24.	*Paris.* Messier.	
*1770.	Jan.	18.	*Gurzelen.* Sprüngli.	
* "	"	18.	*Vienna.* Pilgram.[3]	
* "	Feb.	12.	*Gurzelen.* Sprüngli.	
"	Aug.	28.	*Paris and Honfleur.* Cotte	
* "	Sept.	17.	*Gurzelen.* Sprüngli.	
*1771.	March	13.	*Gurzelen.* Sprüngli.	
* "	May	13?	*Gurzelen.* Sprüngli.	
1772.	Oct.	26.	Wolf.[4]	
* "	"	27.	*Gurzelen.* Sprüngli.	
* "	"	27.	*Vienna.* Pilgram.	
* "	Dec.	24.	Wolf.	
1773.[5]	Jan.	24.	*Gurzelen.* Sprüngli.	
1774.	March	*x.*	*Buxton.* Hey.[6]	
* "	Dec.	1.	*Berlin.* Beguelin. Wolf.[7]	
*1775.	Jan.	23.	*Berlin.* Beguelin. Wolf.[8]	
* "	"	24.	*Berlin.* Beguelin. Wolf.	
* "	"	30.	*Berlin.* Beguelin. Wolf.	
"	Oct.	*x.*	*Leeds.* Hey.	
1777.	Sept.	4.	*Berlin.* Beguelin. Wolf.[9]	
"	Dec.	5.	*Montmorenci.* Cotte. Wolf.[10]	
1778.	April	18.	Wolf.	
"	Aug.	18.	*Berlin.* Beguelin. Wolf.[11]	
*1779.	March	15.	*Ratisbon.* Heinrich. Wolf.[12]	

[1] Phil. Trans. LX. 138.

[2] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich V. 218.

[3] Mittheil. Naturforsch. Gesellsch. Bern, 1855, p. 43.

[4] Hell's Reise nach Wardoe etc.

[5] Mém. de Savans Etrang. Paris, VII. 480.

[6] Connaiss. de Tems., 1806, p. 429.

[7] Collectio Observ. Trans. Veneris. St. Petersburg, 1770. pp. 75–106. It is not *always* stated whether the observations are made in *old* or *new* style. Pictet's are said to be in *new style.*

[8] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, II. 403.

[9] Connaiss. de Tems., 1806, p. 429.

[1] Connaiss. de Tems., 1806, p. 429.

[2] Phil. Trans. LIX. 372, 3.

[3] Untersuchungen über das Wahrscheinlich der Wetterkunde etc., p. 419.

[4] He quotes the Journal des Savans, 1773.

[5] Cotte observed at Montmorenci in 1772 six auroras: one in March, a very fine one on August 31, three in October, of which that of the 26th was fine, and one in December.—*Journal des Savans,* 1773, p. 174.

[6] Phil. Trans. LXXX. 32.

[7] Bode's Jahrbuch für 1787, p. 241.

[8] Nouv. Mém. de l'Acad. Berlin, 1775, p. 175, etc.

[9] This is given as Sept. 24 in Nouv. Mém de l'Acad. Berlin, 1777, p. 91.

[10] Connaiss. de Tems., 1781, p. 390.

[11] This is given as Aug. 28 in Nouv. Mém. de l'Acad. Berlin, 1778, p. 85.

[12] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich. V. 327.

1779.	April	3.	*Berlin.*	Beguelin.	Wolf.[1]
"	"	6.	*Berlin.*	Beguelin.	Wolf.
* "	"	7.	*Berlin.*	Beguelin.	Wolf.[2]
* "	"	8.	*Berlin.*	Beguelin.	Wolf.
* "	"	9.	*Berlin.*	Beguelin.	Wolf.
"	"	10.	*Berlin.*	Beguelin.	Wolf.
* "	"	11.	*Ratisbon.*	Heinrich.	Wolf.
* "	"	17.	*Berlin.*	Beguelin.	Wolf.
1780.	May	17.	Wolf.[3]		
"	July	18.	*Montmorenci.*	Cotte.[4]	
"	"	20.	Wolf.		
"	Aug.	15.	*Ratisbon?*	Heinrich.	
"	Dec.	7.	Wolf.		
*1781.	Jan.	30.	Wolf.[5]		
"	Feb.	12.	Wolf.		
* "	April	25.	*Montmorenci.*	Cotte.	Wolf.[6]
"	June	6.	*Ratisbon.*	Heinrich.	
* "	Aug.	26.	*Ratisbon.*	Heinrich	
1782.	April	9.	Wolf.[7]		
*1783.	March	29.	*New York.*[8]		
1784.	May	12.	*Paris.*	Cassini.	Wolf.[9]
* "	"	17.	*Paris.*	Cassini.	
"	"	22.	*Paris.*	Cassini.	Wolf.
* "	July	25.	*Paris.*	Cassini.	
* "	"	25.	*Geneva.*	Cotte.[10]	
* "	Nov.	15.	*Paris.*	Cassini.	
1785.	March	3.	*Vienna.*	Pilgram.	
*1786.	"	23.	*Switzerland?*	Vogel.	Wolf.
"	July	13.	*Paris.*	Cassini.	Wolf.[11]
*1787.	May	13.	*Vienna and Laon.*[12]		
* "	July	13.	*Vienna and Laon.*		
* "	Oct.	31.	*Paris.*	Bouvard.[13]	
* "	Nov.	8.	*Caen and Laon.*		
*1788.	Sept.	2.	*Berne.*	Studer.[14]	
1788.	Oct.	13.	*Paris.*	Bouvard.	Wolf.[1]
*1790.	Jan.	29.	*Paris.*	Bouvard.[2]	
"	Feb.	4.	*Paris.*	Bouvard.	Wolf.
"	"	24.	*Paris.*	Bouvard.	Wolf.
* "	March	8.	*Paris.*	Bouvard.	Wolf.
* "	May	17.	*Paris.*	Bouvard.	Wolf.[8]
"	June	4.	*Paris.*	Bouvard.	Wolf.
* "	July	16.	*Paris.*	Bouvard.	
* "	Sept.	30.	*Paris.*	Bouvard.	Wolf.
*1791.	Jan.	6.	*Paris.*	Bouvard.	Wolf.[4]
"	Aug.	8.	*Paris.*	Bouvard.	Wolf.
* "	Dec.	26.	*Paris.*	Bouvard.	
1792.	Nov.	19.	*Kendal.*	Dalton.	Wolf.[5]
1793.	March	4.	*Paris.*	Bouvard.[6]	
*1794.	April	30.	*Paris.*	Bouvard.[7]	
"	Dec.	7.	*Paris.*	Bouvard.	Wolf.[8]
* "	"	8.	*Paris.*	Bouvard.[9]	
1795.	Oct.	16.	*Paris.*	Bouvard.	Wolf.[10]
"	"	17.	*Paris.*	Bouvard.	Wolf.
1796.	May	22.	*Paris.*	Bouvard.[11]	
1797.	Dec.	20.	*Manchester.*	Dalton.	Wolf.[12]
1799.	July	24.	*Paris.*	Wolf.[13]	
"	Sept.	4.	*Paris.*	Wolf.[14]	
1800.	March	18.	*Manchester.*	Dalton.	Wolf.
"	Aug.	15.	*Paris.*	Bouvard.[15]	
"	"	18.	*Paris.*	Bouvard.	
1801.	"	18.	*Manchester.*	Dalton.	Wolf.
1802.	June	3.	*Ratisbon.*	Heinrich.	
*1803.	Sept.	19.	*Near the Naze, Norway.*		Wolf.[16]
1806.	Nov.	30.	*Switzerland.*	Vogel.	Wolf.
1807.	Jan.	26.	Wolf.[17]		

[1] Nouv. Mém. de l'Acad. Berlin, 1779, p. 106.

[2] The auroras of April 7 and 8 are found only in Bode's Astronomisch. Jahrbuch für 1787.

[3] Schweiz. Mon. Nachr., 1780.

[4] Journ. des. Savans, 1781, p. 180.

[5] Schweiz. Mon. Nachr., 1781.

[6] Connaiss. de Tems., 1785, p. 392.

[7] Schweiz. Mon. Nachr., 1782.

[8] Journ. des. Savans, 1781, p. 180.

[9] Connaiss. de Tems., 1788, p. 337.

[10] Journ. de Physique, XLIII. 453.

[11] Connaiss. de Tems., 1790, p. 370

[12] Journ. de Physique, LXV. 255.

[13] Connaiss. de Tems., 1791, p. 360

[14] Mittheil. Naturforsch. Gesellsch. Bern, 1855, p. 43.

[1] Connaiss. de Tems., 1792, p. 356.

[2] Connaiss. de Tems., 1793, p. 375.

[3] Connaiss. de Tems., 1793, p. 375.

[4] Connaiss. de Tems., 1794, pp. 284, 285.

[5] This is the same aurora which is put erroneously on Nov. 29 in my first catalogue.

[6] Connaiss. de Tems., 1795, p. 424.

[7] Connaiss. de Tems., 1796–7, p. 392.

[8] Bode's Jahrbuch für 1799.

[9] Connaiss. de Tems., 1797–8, p. 466.

[10] Connaiss de Tems., 1798, p. 486.

[11] Connaiss. de Tems., 1798–9, pp. 486, 7.

[12] Memoirs of the Lit. and Philosophical Society, Manchester, V. p. 674.

[13] Connaiss. de Tems., 1803, p. 511.

[14] These are the same as I have translated July 23 and Sept. 3. Thermidor 5 and Fructidor 17.

[15] Connaiss. de Tems., 1803–4, p. 503.

[16] Krusenstern's Reise um die Welt etc. Hoppner's Transl. I. 32.

[17] Neueste Schriften von Danzig, II.

1810.

Oct.	5.	*Ratisbon.*	Heinrich.	

1813.

June	24.	*Augsburg?*	Stark.	Wolf.[1]
Sept.	24.	*Augsburg?*	Stark.	Wolf.

1814.

April	15.	*Ratisbon.*	Heinrich.	
May	22.	*Ratisbon.*	Heinrich.	

1815.

March	2.	*Ratisbon.*	Heinrich.	
May	29.	*Ratisbon.*	Heinrich.	

1816.

May	17.	*Ratisbon.*	Heinrich.	

1817.

*Feb.	8.	*Paris.*	Bouvard.[2]	
"	10.	*Ratisbon.*	Heinrich.	
June	12.	*Ratisbon.*	Heinrich.	
Aug.	16.	*Ratisbon.*	Heinrich.	

1818.

Jan.	11.	*Prague?*	David.	Wolf.[3]
April	4.	*Ratisbon.*	Heinrich.	Wolf.

1819.

April	26.	*Ratisbon.*	Heinrich.	Wolf.
*Oct.	12.	*New York.*	Nash?[4]	

1821.

Jan.	3.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.[5]
"	6.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	13.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	15.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
* "	16.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	17.	*Nis'hne-Kolymsk.*	Wrangel.	
* "	23.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
* "	24.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
* "	25.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	26.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
*Feb.	2.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
* "	3.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
* "	11.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
* "	12.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
Feb.	17.	*Sweaburg.*	Von Trousson.	Wolf.[1]
"	21.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
* "	22.	*Nis'hne-Kolymsk.*	Wrangel.	
*March	1.	*Nis'hne-Kolymsk.*	Wrangel.	
* "	2.	*Nis'hne-Kolymsk.*	Wrangel.	
* "	3.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
* "	8.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
* "	12.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
Sept.	12.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	13.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	20.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	21.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	22.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	23.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	25.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
Oct.	1.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	3.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	14.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	17.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	19.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	20.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
Nov.	12.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	13.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
* "	15.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	16.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
*Dec.	2.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	11.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	17.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.

1822.

Jan.	4.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	5.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	6.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	7.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
* "	13.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
Feb.	9.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
March	8.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	9.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
Sept.	5.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
Oct.	5.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
Nov.	4.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	5.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	8.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	11.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	13.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	22.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	23.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	24.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	29.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.

[1] Meteorolog. Jahrbuch mit Rücksicht etc.

[2] Connaiss. de Tems., 1822, p. 216.

[3] He quotes David's Witterungsbeob. in Böhmen.

[4] Ladies' and Gentlemen's Diary, 1821, p. 79.

[5] Reise längs der Nordküste von Siberien und auf dem Eismeere, 1820–4. II. 276–288.

[1] Bode. Astronomische Jahrbuch, 1824, p. 249.

1823.

Feb.	24.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
"	28.	*Nis'hne-Kolymsk.*	Wrangel.	Wolf.
Sept.	2.	*Abo.*	Argelander.[1]	

1824.

March	25.	*Abo.*	Argelander.[2]
"	26.	*Abo.*	Argelander.
*Nov.	16.	*Abo.*	Argelander.
Dec.	18.	*Abo.*	Argelander.

1825.

*Feb.	14.	*Abo.*	Argelander.
*March	14.	*Abo.*	Argelander.
*Aug.	21.	*Abo.*	Argelander.
* "	26.	*Abo.*	Argelander.
"	29.	*Abo.*	Argelander.
*Sept.	11.	*Abo.*	Argelander.
"	14.	*Abo.*	Argelander.
"	16.	*Abo.*	Argelander.
Oct.	13.	*Abo.*	Argelander.
Dec.	2.	*Abo.*	Argelander.
* "	7.	*Abo.*	Argelander.
* "	8.	*Abo.*	Argelander.

1826.

*Jan.	5.	*Abo.*	Argelander.
"	6.	*Abo.*	Argelander.
"	7.	*Abo.*	Argelander.
* "	29.	*Abo.*	Argelander.
Feb.	2.	*Abo.*	Argelander.
* "	10.	*Abo.*	Argelander.
*March	9.	*Abo.*	Argelander.
*Nov.	20.	*Abo.*	Argelander.
* "	22.	*Abo.*	Argelander.
"	23.	*Abo.*	Argelander.[3]

1827.

*Feb.	17.	*Abo.*	Argelander.
"	18.	*Abo.*	Argelander.
"	22.	*Abo.*	Argelander.
"	24.	*Abo.*	Argelander.
March	19.	*Abo.*	Argelander.
*April	16.	*Abo.*	Argelander.
"	18.	*Abo.*	Argelander.
*Aug.	26.	*Abo.*	Argelander.
*Sept.	8.	*Abo.*	Argelander.
* "	9.	*Abo.*	Argelander.
"	17.	*Bossekop.*	Everest.[1]
"	24.	*Bossekop.*	Everest.
* "	25.	*Abo.*	Argelander. *Paris.* Bouvard.[2]
"	29.	*Bossekop.*	Everest.
"	30.	*Bossekop.*	Everest.
*Oct.	6.	*Abo.*	Argelander.
"	7.	*Abo.*	Argelander.
"	10.	*Bossekop.*	Everest.
"	11.	*Bossekop.*	Everest.
"	15.	*Bossekop.*	Everest.
* "	17.	*Abo.*	Argelander.
"	24.	*Bossekop.*	Everest.
"	27.	*Keilhau.*	Everest.
"	29.	*Tolrig.*	Everest.
*Nov.	19.	*Abo.*	Argelander.
"	21.	*Abo.*	Argelander.
"	25.	*Abo.*	Argelander.

1828.

Jan.	7.	*Abo.*	Argelander.
*Feb.	12.	*Abo.*	Argelander.
"	18.	*Abo.*	Argelander.
"	23.	*Abo.*	Argelander.
March	17.	*Abo.*	Argelander.
Aug.	12.	*Abo.*	Argelander.
* "	14.	*Abo.*	Argelander.
* "	16.	*Abo.*	Argelander.
"	17.	*Abo.*	Argelander.
*Sept.	8.	*Abo.*	Argelander.
* "	15.	*Abo.*	Argelander.
"	16.	*Abo.*	Argelander.
"	17.	*Abo.*	Argelander.
"	19.	*Abo.*	Argelander.
"	21.	*Abo.*	Argelander.
Oct.	4.	*Abo.*	Argelander.
* "	26.	*Abo.*	Argelander.
"	31.	*Abo.*	Argelander.
Nov.	6.	*Abo.*	Argelander.
"	9.	*Abo.*	Argelander.
"	29.	*Tobolsk.*	Hansteen.[3]
"	30.	*Abo.*	Argelander.

[1] Verzeichniss von Nordlichtern etc. Abdruck aus den Abhandlungen des Finnischen Societat etc., p. 5.

[2] Wolf assigns this aurora to March 15. Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, II. 410.

[3] Nov. 27. Wolf.

[1] A Journey through Norway, Lapland, etc., pp. 382, 383.

[2] Connaiss. de Tems., 1831, p. 216.

[3] Result. Magnet. Astron. und Meteor. Beobacht. auf eine Reise etc.

*Dec.	1.	*Abo.*	Argelander.
"	3.	*Tobolsk.*	Hansteen.
"	5.	*Abo.*	Argelander.
"	6.	*Abo.*	Argelander.
* "	28.	*Abo.*	Argelander.

1829.

Feb.	9.	*Abo.*	Argelander.
"	14.	*Atschinskaia.*	Hansteen.
"	20.	*Abo.*	Argelander.
March	1.	*Abo.*	Argelander.
"	8.	*Abo.*	Argelander.
"	28.	*Abo.*	Argelander.
"	28.	*Ustskskaia.*	Due.[1]
"	29.	*Abo.*	Argelander.
"	30.	*Abo.*	Argelander.
April	2.	*Mutinskaia.*	Due.
* "	5.	*Witunskaia.*	Due.
* "	8.	*Abo.*	Argelander. *Irkuzk.* Hansteen.
"	9.	*Abo.*	Argelander.
"	14.	*Abo.*	Argelander.
"	24.	*Abo.*	Argelander.
Sept.	2.	*Abo.*	Argelander.
* "	22.	*Abo.*	Argelander.
"	24.	*Abo.*	Argelander.
"	25.	*Abo.*	Argelander.
* "	26.	*Abo.*	Argelander.
*Oct.	1.	*Abo.*	Argelander.
"	2.	*Abo.*	Argelander.
"	4.	*Abo.*	Argelander.
* "	24.	*Abo.*	Argelander.
*Nov.	1.	*Abo.*	Argelander.
"	3.	*Abo.*	Argelander.
* "	17.	*Abo.*	Argelander.
* "	19.	*Abo.*	Argelander.
* "	24.	*Abo.*	Argelander.
* "	25.	*Abo.*	Argelander.
"	27.	*Abo.*	Argelander.
*Dec.	20.	*Abo.*	Argelander.
"	22.	*Abo.*	Argelander.
* "	25.	*Abo.*	Argelander.

1830.

Jan.	20.	*Abo.*	Argelander.
"	22.	*Abo.*	Argelander.
"	23.	*Abo.*	Argelander.
* "	24.	*Abo.*	Argelander.
*Feb.	23.	*Abo.*	Argelander.
* "	24.	*Abo.*	Argelander.
March	14.	*Abo.*	Argelander.
* "	16.	*Abo.*	Argelander.
"	19.	*Abo.*	Argelander.
"	21.	*Abo.*	Argelander.
April	10.	*Abo.*	Argelander.
*May	4.	*Abo.*	Argelander.
* "	5.	*Abo.*	Argelander.
*Aug.	25.	*Abo.*	Argelander.
*Sept.	8.	*Abo.*	Argelander.
"	14.	*Abo.*	Argelander.
* "	17.	*Abo.*	Argelander.
* "	25.	*Abo.*	Argelander.
"	26.	*Abo.*	Argelander.
*Oct.	5.	*Abo.*	Argelander.
* "	9.	*Abo.*	Argelander.
* "	10.	*Abo.*	Argelander.
* "	11.	*Abo.*	Argelander.
"	12.	*Abo.*	Argelander.
* "	17.	*Abo.*	Argelander.
"	19.	*Abo.*	Argelander.
* "	22.	*Abo.*	Argelander.
"	23.	*Abo.*	Argelander.
"	30.	*Wasa.*	Von Schoultz.[1]
Nov.	2.	*Abo.*	Argelander.
* "	19.	*Abo.*	Argelander.
* "	20.	*Abo.*	Argelander.
"	25.	*Abo.*	Argelander.
Dec.	2.	*Abo.*	Argelander.
* "	16.	Wolf.[2]	[Should it not be 1829 ?]
"	18.	*Abo.*	Argelander.
* "	22.	*Abo.*	Argelander.

1831.

*Jan.	7.	*Wasa.*	Von Schoultz. *Paris.* Bouvard.[3]
* "	7.	*St. Petersburg.*	Kupffer.[4]
* "	7.	*Brunswick.*	Zincken. *Marburg.* Gerling.[5]
* "	8.	*Wasa.*	Von Schoultz.
"	9.	*Abo.*	Argelander.
"	9.	*Wasa.*	Von Schoultz.
* "	10.	*Abo.*	Argelander.
* "	10.	*Wasa.*	Von Schoultz.

[1] Result. Magnet. Astron. und Meteor. Beobacht. auf eine Reise etc.

[1] Verzeichniss von Nordlichtern etc. Abdruck aus den Abhandlungen der Finnischen Societät etc., p. 144.

[2] Vierteljahrsschrift &c. II. 86, Bib. Univ., 1840, p. 208.

[3] Connaiss. de Tems., 1833, p. 368.

[4] Recueil d'Observ. Magnet. á St. Petersburg, p. 679.

[5] Kastner, Archiv für Naturlehre XXI., 26 and 28.

*Jan.	11.	*Abo.*	Argelander.
"	12.	*Abo.*	Argelander.
"	13.	*Abo.*	Argelander.
* "	14.	*Abo.*	Argelander.
"	18.	*Abo.*	Argelander.
"	19.	*Abo.*	Argelander.
"	24.	*Abo.*	Argelander.
*Feb.	7.	*Abo.*	Argelander.
* "	11.	*Abo.*	Argelander.
"	13.	*Abo.*	Argelander.
* "	14.	*Abo.*	Argelander.
"	15.	*Abo.*	Argelander.
*March	1.	*St. Petersburg.*	Kupffer.
* "	5.	*Wasa.*	Von Schoultz.
* "	7.	*Abo.*	Argelander.
* "	8.	*Abo.*	Argelander.
* "	9.	*St. Petersburg.*	Kupffer.
* "	11.	*Abo.*	Argelander.
* "	11.	*Wasa.*	Von Schoultz.
* "	13.	*Wasa.*	Von Schoultz.
* "	13.	*Augsburg.*	Stark. Wolf.
"	17.	*Abo.*	Argelander.
"	17.	*Augsburg?*	Stark. Wolf.
* "	18.	*Augsburg?*	Stark. Wolf.
"	23.	*Abo.*	Argelander.
*April	1.	*Abo.*	Argelander.
* "	2.	*Abo.*	Argelander.
"	7.	*Abo.*	Argelander.
"	10.	*Abo.*	Argelander.
"	11.	*Abo.*	Argelander.
"	14.	*Abo.*	Argelander.
* "	18.	*Abo.*	Argelander.
* "	19.	*Abo.*	Argelander.
* "	19.	*Wasa.*	Von Schoultz.
* "	20.	*Wasa.*	Von Schoultz.
* "	23.	*Abo.*	Argelander.
"	24.	*Abo.*	Argelander.
*Aug.	3.	*St. Petersburg.*	Kupffer.
"	30.	*Augsburg?*	Stark. Wolf.

1832.

Feb.	20.	*Wasa.*	Von Schoultz.
"	21.	*Wasa.*	Von Schoultz.
March	2.	*Wasa.*	Von Schoultz.
*April	19.	*Wasa.*	Von Schoultz.
*Aug.	22.	*Helsingfors.*	Argelander.
*Sept.	23.	*Helsingfors.*	Argelander.
Oct.	15.	*Helsingfors.*	Argelander.
Oct.	22.	*Wasa.*	Von Schoultz.
*Nov.	1.	*Wasa.*	Von Schoultz.
"	12.	Quetelet.[1]	Wolf.
"	20.	*Helsingfors.*	Argelander.
* "	27.	*Helsingfors.*	Argelander.

1833.

Jan.	18.	*Wasa.*	Von Schoultz.
* "	19.	*Wasa.*	Von Schoultz.
"	20.	*Wasa.*	Von Schoultz.
"	21.	*Wasa.*	Von Schoultz.
Feb.	8.	*Wasa.*	Von Schoultz.
"	12.	*Wasa.*	Von Schoultz.
*March	13.	*Nova Zembla.*	Kupffer.
* "	17.	*Wasa.*	Von Schoultz.
* "	23.	*Helsingfors.*	Argelander.[2]
April	6.	*Wasa.*	Von Schoultz.
*Sept.	6.	*Nova Zembla.*	Kupffer.
* "	17.	*Helsingfors.*	Argelander.
* "	17.	*Wasa.*	Von Schoultz.
* "	18.	*Wasa.*	Von Schoultz.
Oct.	10.	*Wasa.*	Von Schoultz.
"	11.	*Wasa.*	Von Schoultz.
* "	12.	*Paris.*	Bouvard.[3]
* "	13.	Wolf.[4]	
"	19.	*Wasa.*	Von Schoultz.
*Dec.	15.	Quetelet.	

1834.

*Jan.	13.	*Wasa.*	Von Schoultz.
*Feb.	10.	*Augsburg?*	Stark. Wolf.
*Sept.	6.	*Nova Zembla.*	Kupffer.
*Oct.	3.	*Wasa.*	Von Schoultz.
*Nov.	3.	*Wasa.*	Von Schoultz.
*Dec.	10.	*Nova Zembla.*	Kupffer.
* "	22.	*Wasa.*	Von Schoultz.

1835.

*Jan.	4.	*Augsburg?*	Stark. Wolf.
*Feb.	7.	*Wasa.*	Von Schoultz.
March	20.	*Wasa.*	Von Schoultz.
Aug.	3.	*Helsingfors.*	Argelander.
"	17.	*Wasa.*	Von Schoultz.

[1] Nouveau catalogue. Mém. de l'Acad. Brux. XV. 49.

[2] Wolf assigns the aurora of March 23 to March 13. He also has one on Aug. 26.

[3] Connaiss. de Tems., 1837, p. 379.

[4] Bibliotheque Universelle, Geneva, 1840, XXX. 209.

Sept. 5. *Wasa.* Von Schoultz.
*Nov. 17. *Helsingfors.* Argelander.
* " 18. *Helsingfors.* Argelander.
* " 18. *Wasa.* Von Schoultz.
" 24. *Helsingfors.* Argelander.
Dec. 8. *Helsingfors.* Argelander.
" 8. *Wasa.* Von Schoultz.
* " 10. *Helsingfors.* Argelander.
" 13. *Helsingfors.* Argelander.
" 23. *Helsingfors.* Argelander.

1836.

Feb. 20. *Helsingfors.* Argelander.[1]
*March 17. *Helsingfors.* Argelander.[2]
" 23. *Helsingfors.* Argelander.
*May 20. *Paris.* Bouvard.[3]
*Sept. 13. *Helsingfors.* Argelander.
" 14. *Helsingfors.* Argelander.
* " 15. *Helsingfors.* Argelander.
" 16. *Helsingfors.* Argelander.
" 30. *Helsingfors.* Argelander.
Oct. 8. *Helsingfors.* Argelander.
* " 11. *Helsingfors.* Argelander.
* " 11. *Braunsberg.* Feldt. Wolf.[4]
" 12. *Helsingfors.* Argelander.
" 12. *Braunsberg.* Feldt. Wolf.
* " 15. *Helsingfors.* Argelander.
* " 18. *Helsingfors.* Argelander.
* " 18. *Wasa.* Von Schoultz. *Braunsberg.*
" 19. *Switzerland?* Vogel. Wolf.
Nov. 27. *Augsburg?* Stark. Wolf.

1837.

*Jan. 25. *Philadelphia.* Peirce.[5]
* " 25. *Helsingfors.* Argelander.
Feb. 13. *Augsburg?* Stark. Wolf.
" 14. *Zurich?* Wolf.[6]
* " 18. *Paris.* Bouvard.[7]
* " 18. *Helsingfors.* Argelander.
*March 29. *Zurich?* Wolf.

[1] Wolf assigns this aurora to Feb. 22.

[2] According to the Vermont Chronicle only one aurora was seen in the winter of 1835–6, though twelve appeared in the preceding winter. — *American Almanac,* 1838, p. 179.

[3] Connaiss. de Tems., 1840, p. 397.

[4] Pogg. Annalen der Physik, XLI., 545.

[5] Meteor. Account of the Weather, pp. 29 and 228.

[6] Meteor. Beobacht. der Naturforsch. Gesellsch. in Zürich.

[7] Connaiss. de Tems., 1841, p. 417.

May 2. *Augsburg?* Stark. Wolf.
July 28. *Augsburg?* Stark. Wolf.
*Oct. 6. *Paris.* Bouvard.
* " 18. *Pekin.* Kupffer.
*Nov. 5. *Paris.* Bouvard.
" 6. *Augsburg.* Stark. Wolf.
* " 12. *Paris.* Bouvard.
* " 14. *Philadelphia.* Peirce. *Paris.* Bouvard.
* " 15. *Paris.* Bouvard.
* " 15. *Catherinebourg.* Kupffer.

1838.

Oct. 21. Bravais. Wolf.[1]

1839.

*Jan. 1. *Nijne-Taguilsk, Mt. Ural.*
* " 14. *Worcester.* Woodward.[2]
* " 19. *Baltischport.* Kupffer.[3]
*Feb. 21. *Baltischport.* Kupffer.
*March 5. *Worcester.* Woodward.
* " 10. *Baltischport.* Kupffer.
* " 11. *Baltischport.* Kupffer.
* " 15. *Worcester.* Woodward.
* " 19. *Baltischport.* Kupffer.
* " 24. *Worcester.* Woodward.
*April 1. *Baltischport.* Kupffer.
* " 3. *Baltischport.* Kupffer.
* " 8. *Worcester.* Woodward.
* " 9. *Baltischport.* Kupffer.
* " 16. *Baltischport.* Kupffer.
*May 9. *Worcester.* Woodward.
* " 10. *Worcester.* Woodward.
* " 15. *Worcester.* Woodward.
*Aug. 30. *Baltischport.* Kupffer.
*Sept. 1. *Zurich?* Wolf.[4]
" 2. *Worcester.* Woodward.[5]
* " 3. *Worcester.* Woodward.
* " 14. *Worcester.* Woodward.
* " 19. *Worcester.* Woodward.
*Oct. 10. *Worcester.* Woodward.
* " 22. *Worcester.* Woodward.
*Nov. 6. *Worcester.* Woodward.
* " 11. *Worcester.* Woodward.

[1] Bulletin de l'Acad. Roy. Brux. VIII., 45.

[2] Med. and Surg. Journ., XX. 35, 163, 291.

[3] Annal. de l'Observ. Physique Centrale de Russie, 1849. Suppl. pp. 15 et 119.

[4] Meteorolog. Beobacht. Zürich.

[5] Med. and Surg. Journ., XXI., 151, 231, and 295.

Nov.	12.	*Prague?* Wolf.[1]
"	23.	*Worcester.* Woodward.

1840.

*Jan.	1.	*Baltischport.* Kupffer.
* "	2.	*Russia.* Wolf.[2]
* "	3.	*Worcester.* Woodward.[3]
* "	4.	*Worcester.* Woodward.
* "	5.	*Worcester.* Woodward.
* "	31.	*Worcester.* Woodward.
*Feb.	21.	*Baltischport.* Kupffer.
* "	25.	*Baltischport.* Kupffer.
*March	2.	*Baltischport.* Kupffer.
"	3.	*Baltischport.* Kupffer.
* "	6.	*Worcester.* Woodward.
* "	26.	*Baltischport.* Kupffer.
* "	27.	*Baltischport.* Kupffer.
* "	28.	*Baltischport.* Kupffer.
*April	4.	*Worcester.* Woodward.
"	15.	*Worcester.* Woodward.
*May	29.	*Worcester.* Woodward.
* "	29.	*Philadelphia.* Bache.[4]
June	14.	*Worcester.* Woodward.
*July	4.	*Philadelphia.* Bache.
* "	25.	*Worcester.* Woodward.
* "	29.	*Worcester.* Woodward.
Aug.	15.	*St. Petersburg.* Wolf.[5]
* "	19.	*Worcester.* Woodward.[6]
* "	19.	*Philadelphia.* Bache.
* "	25.	*Worcester.* Woodward.
* "	26.	*Worcester.* Woodward.
* "	28.	*Worcester.* Woodward.
* "	28.	*Philadelphia.* Bache.
Sept.	16?	*Toronto.* Sabine. Wolf.
*Oct.	19.	*Baltischport.* Kupffer.
* "	22.	*Worcester.* Woodward.
*Nov.	13.	*Worcester.* Woodward.
* "	15.	*Worcester.* Woodward.
* "	19.	*Worcester.* Woodward.
* "	20.	*Worcester.* Woodward.
* "	20.	*Baltischport.* Kupffer.
*Dec.	13.	*Baltischport.* Kupffer.
Dec.	19.	*Worcester.* Woodward.
* "	20.	*Baltischport.* Kupffer.
* "	21.	*Worcester.* Woodward.
* "	21.	*Baltischport.* Kupffer.
* "	28.	*Worcester.* Woodward.
"	29.	*Worcester.* Woodward.

1841.

*Jan.	2?	Wolf.[1]
* "	14.	*Worcester.* Woodward.[2]
* "	25.	*Worcester.* Woodward.
*Feb.	8.	*Worcester.* Woodward.
* "	12.	*Toronto.* Sabine. Wolf.
* "	15.	*Toronto?* Sabine. Wolf.
* "	16.	*Baltischport.* Kupffer.
* "	18.	*New Haven.* Wolf.[3]
*March	22.	*Baltischport.* Kupffer.
April	15.	*Prague?* Wolf.
*Aug.	2.	*Prague?* Wolf.
*Sept.	10.	*Prague?* Wolf.
* "	12.	*Prague?* Wolf.
* "	18.	*Prague?* Wolf.
*Oct.	14.	*Prague?* Wolf.
* "	25.	*Prague?* Wolf.
*Nov.	15.	*Prague.* Wolf.
* "	18.	*Worcester.* Woodward.[4]
*Dec.	1.	*Prague?* Wolf.
* "	15.	*Prague?* Wolf.
* "	24.	*Prague?* Wolf.

1842.

*Jan.	1.	*Baltischport.* Kupffer.
*March	17.	*Baltischport.* Kupffer.
*April	10.	*Baltischport.* Kupffer.
*July	11.	*Toronto.* Sabine. Wolf.[5]
Sept.	16.	*Toronto.* Sabine. Wolf.

1843.

*Feb.	4.	*Sitka.* Kupffer.
*April	17.	*Sitka.* Kupffer.[6]

[1] Prager Beobachtungen, 1839.
[2] Bull. de l'Acad. Brux. X. 9.
[3] Med. and Surg. Journal, XXII. 20, 148, 212, 292, and 355.
[4] Magnet. and Meteor. Observ. Girard College, 51.
[5] Bull. de l'Acad. Brux. IX. 617.
[6] Medical and Surg. Journal, XXIII., 87, 231, 296, and 376.

[1] Bull. de l'Acad. Brux. X. 9.
[2] Med. and Surg. Journal, XXIV., 20 and 83.
[3] Bull. de l'Acad. Brux. VIII. 64.
[4] Med. and Surg. Journal, XXV., 295.
[5] Magnetic and Meteorolog. Observations, Toronto, I. 315.
[6] At Lougan, from the 16th of March for fifteen days, and from 5 P. M. to midnight, a white light, similar to the aurora borealis, was observed extending in a column from S. E. to N. W. — Annuaire Magnet. et Meteor. de Russie, 1843, p. 451. See, also, pp. 508 and 533.

*July 7. *Toronto.* Sabine. Wolf.
Sept. 6. *Bogoslowski.* Kupffer.[1]
* " 27. *Sitka.* Kupffer.
*Oct. 15. *Sitka.* Kupffer.
* " 19. *Sitka.* Kupffer.
Dec. 10. *New Haven?* Wolf.[2]

1844.

*March 7. *Sitka.* Kupffer.
" 28. *Sitka.* Kupffer.
*April 16. *Sitka.* Kupffer.
" 24. *New Haven?* Wolf.[3]
June 20. *Toronto.* Sabine. Wolf.
*Sept. 13. *Helsingfors.* Nervander. Wolf.[4]
" 24. *Sitka.* Kupffer.
" 26. *Sitka.* Kupffer.
*Oct. 21. *Sitka.* Kupffer.
*Nov. 6. *Baltischport.* Kupffer.
* " 15. *Sitka.* Kupffer.
* " 16. *Baltischport.* Kupffer.
Dec. 13. *Toronto.* Sabine. Wolf.

1845.

May 4. *Helsingfors.* Nervander
" 15. *Helsingfors.* Nervander.
" 30. *Helsingfors.* Nervander.
Aug. 25. Wolf.[5]

1846.

*Jan. 16. *Baltischport.* Kupffer.
June 16. *Baltischport.* Kupffer.
July 21. *Helsingfors.* Nervander.
" 28. *Helsingfors.* Nervander.
*Aug. 27. *Baltischport.* Kupffer.
*Sept. 11. *Baltischport.* Kupffer.
* " 22. *Baltischport.* Kupffer.
* " 24. *Baltischport.* Kupffer.
* " 25. *Baltischport.* Kupffer.
*Oct. 12. *Helsingfors.* Nervander.
* " 15. *Helsingfors.* Nervander.
* " 19. *Baltischport.* Kupffer.
*Nov. 17. *Baltischport.* Kupffer.
Dec. 12. *Helsingfors.* Nervander.

[1] Annuaire Magnet. et Meteor. de Russie,' 1843, p. 425.
[2] Bull. de l'Acad. Brux. XII. 533.
[3] Bull. de l'Acad. Brux. XII. 534.
[4] Observ. faites à Helsingfors.
[5] Bull. de l'Acad. Brux. XII.

1847.

Feb. 11. *Helsingfors.* Nervander.
*March 19. *Baltishport.* Kupffer.
" 20. *Helsingfors.* Nervander.
" 23. *Helsingfors.* Nervander.
" 26. *Gainsborough.* Thompson.[1]
*April 7. *Hartford, Conn.* Wolf.[2]
* " 20. *Helsingfors.* Nervander.
Oct. 10. *Helsingfors.* Nervander.
* " 24. *Baltischport.* Kupffer.
* " 31. *Christiania,* Wolf.[3]
*Dec. 17. *Baltischport.* Kupffer.
* " 29. *Helsingfors.* Nervander.

1848.

Feb. 9. *Helsingfors.* Nervander. Wolf.
* " 20. *Greenwich.* Glaisher. *Durham.*[4]
* " 22. *Greenwich.* Glaisher. *Stone.*
* " 24. *At Sea, Lt.* 53° 41′ *N. Lg.* 16° 25′ *W.*[5]
March 15. *Stonyhurst.* Glaisher.
* " 19. *Greenwich.* Glaisher. *Durham. Scarva.*
* " 20. *Greenwich.* Glaisher.
* " 20. *Durham. Stonyhurst.*
" 28. *Leeds.* Glaisher.
* " 29. *Hartwick, U. S.* Glaisher.
* " 31. *Greenwich.* Glaisher. *Stonyhurst.*
*April 3. *Greenwich.* Glaisher.
* " 7. *Greenwich.* Glaisher.
* " 17. *Stone.* Lefroy.[6]
* " 29. *Greenwich.* Glaisher.
July 8. *Ship Creole, Lt.* 52° 12 *N. Lg.* 6° 12′ *W.*
* " 11. *Ship Ashley, Lt.* 46° 16′ *N. Lg.* 34° 6′ *E.*
* " 24. *Parma.* Colla. Wolf.[7]
*Sept. 4. *Ship Liverpool, Lt.* 42° 36′ *N. Lg.* 50° *W.*
* " 5. *Ship Liverpool, Lt.* 43° 38′ *N. Lg.* 46° *W.*
" 7. *Franconia, New Hampshire.*
" 23. *Ship Ohio, Lt.* 51° 16′ *N. Lg.* 10° *W.*
* " 30. *Aix-la-Chapelle.* Heis.[8]
Oct. 11. *Fort Confidence?* Richardson.
* " 17. *Stonyhurst.* Lefroy.

[1] Introduction to Meteorology, p. 355.
[2] Fortschritte der Physik. Jahrgang III. 179.
[3] Bull. de l'Acad. Brux. XXI. 289.
[4] Return of the Mortality in 117 Districts of England, VII., No. 1, p. 16; No. 2, p. 17; No. 4, p. 20.
[5] Manuscript Records of the Smithsonian Institution.
[6] From his Manuscript Records.
[7] Bull. de l'Acad. Brux. XVI. 6.
[8] Bull. de l'Acad. Brux. XVI. 4. (Zodiacal Light?)

*Oct. 18. *Greenwich.* Glaisher.
* " 18. *Ship Liberty, Lt.* 49° 4′ *N. Lg.* 13° 50′.
* " 18. *Ship Liverpool, Lt.* 49° 26′ *N. Lg.* 33°.
* " 18. *Ship Creole, Lt.* 41° 57′ *N. Lg.* 63° 29′.
* " 18. *Ship Thomas Wright, Lat.* 42° 29′ *N.*
* " 19. *Greenwich.* Glaisher. [*Long.* 54° 43′ *W.*
* " 19. *Aix-la-Chapelle.* Heis.
* " 19. *Ship Columbia, Lt.* 50° 16′ *N. Lg.* 11°.
* " 19. *Ship Liberty, Lt.* 48° 35′ *N. Lg.* 11° 42′.
* " 19. *Ship Siddons, Lt.* 48° 30′ *N. Lg.* 34° 57′.
* " 19. *Ship Liverpool, Lt.* 48° 41′ *N. Lg.* 37°.
* " 19. *Ship Montezuma, Lt.* 52° 38′ *N. Lg.* 30.
* " 19. *Ship Independence, Lt.* 50° *N. Lg.* 30°.
* " 19. *Ship Creole, Lt.* 43° 32′ *N. Lg.* 60° 11′.
* " 19. *Ship Thomas Wright, Lat.* 43° 10′ *N.*
* " 20. *Greenwich.* Glaisher. [*Long.* 53° 26′ *W.*
* " 22. *Greenwich.* Glaisher. *Aix-la-Chapelle.*
* " 22. *Ship Liverpool, Lt.* 46° 11′ *N. Lg.* 47°.
* " 23. *Ship Creole, Lat.* 45° 20′ *N. Long.* 56°.
* " 23. *Ship Liverpool, Lt.* 44° 33′ *N. Lg.* 51°.
* " 23. *Ship Independence, Lt.* 49° *N. Lg.* 12°.
* " 24. *Greenwich.* Glaisher. [*Long.* 11° 49′ *W.*
* " 24. *Ship Creole, Lat.* 45° 25′ *N. Long.* 55°.
* " 24. *Ship Andrew Foster, Lat.* 43° 2′ *N.*
* " 25. *Greenwich.* Glaisher. [*Lg.* 58° 22′ *W.*
* " 25. *Ship Creole, Lat.* 45° 28′ *N. Long.* 53°.
* " 26. *Ship Creole, Lt.* 44° 55′ *N. Lg.* 48′ 38′.
* " 27. *Greenwich.* Glaisher.
* " 27. *Ship Creole, Lt.* 45° 55′ *N. Lg.* 48° 14′.
* " 28. *Ship Creole, Lt.* 46° 50′ *N. Lg.* 44° 12′.
* " 29? *Greenwich.* Lefroy.
* " 29. *Ship Creole, Lt.* 47° 56′ *N. Lg.* 39° 22′.
* " 30. *Greenwich.* Glaisher.
* " 31. *Ship Creole, Lt.* 49° 28′ *N. Lg.* 33° 17′.
* " 31. *Ship Thomas Wright, Lt.* 54° *N. Lg.* 34°.
*Nov. 1. *Ship Creole, Lt.* 50° 41′ *N. Lg.* 33° 57′.
* " 2. *Ship Creole, Lt.* 49° 52′ *N. Lg.* 33° 48′.
* " 3. *Ship Creole, Lt.* 49° 12′ *N. Lg.* 33° 40′.
* " 4. *Ship Creole, Lt.* 50° 17′ *N. Lg.* 32° 58′.
* " 7. *Ship Creole, Lt.* 49° 50′ *N. Lg.* 28° 8′ *W.*
" 13. *Greenwich.* Glaisher.
* " 14. *Greenwich.* Glaisher.
* " 16. *Ship Westminster, Lt.* 47° 37′ *N. Lg.* 44°.
* " 17. *Orenbourg.* Anitschkoff.[1]
* " 17. *Greenwich.* Glaisher. *Aix-la-Chapelle.*

[1] Annales de l'Observ. Physique Centrale de Russie, 1863. Suppl. p. 240.

*Nov. 17. *Leipsic. Rome.*[1] *Baltischport.* Kupffer.
* " 17. *Australia. Lt.* 33° 25′ *S. Lg.* 122° 32′ *E.*
* " 17. *Ship Marmion, Lt.* 48° 9′ *N. Lg.* 22° 11′.
* " 17. *Schooner Dorcas, Lt.* 31° 44′ *N. Lg.* 78°.
* " 17. *Ship Arcole, Lt.* 44° 46′ *N. Lg.* 46° 40′.
* " 18. *Greenwich.* Glaisher. *Ship Creole.*
* " 18. *Ship Massachusetts, Lat.* 27° *N. Lg.* 62°.
* " 18. *Ship G. A. Hopley, Lat.* 27° *N. Lg.* 38°.
* " 19. *Baltischport.* Kupffer. [*Long.* 37° 58′ *W.*
* " 19. *At Sea, Lt.* 50° 11′ *N. Lg.* 13° 10 *W.*
* " 19. *Barque E. Swift, Lt.* 55° 10′ *N. Lg.* 9°.
* " 21. *Baltischport.* Kupffer. *Greenwich.*
* " 23. *Greenwich.* Glaisher.
* " 24. *Greenwich.* Glaisher.
* " 25. *Greenwich.* Glaisher.
* " 26. *Greenwich.* Glaisher.
* " 30. *Greenwich.* Glaisher.
*Dec. 13. *Greenwich.* Glaisher.
* " 14. *Ship Marmion, Lt.* 57° 46′ *N. Lg.* 20° 6′.
* " 17. *Greenwich.* Glaisher.
* " 18. *Ship Arlington, Lt.* 42° 2′ *N. Lg.* 55°.
* " 21. *Ship Marmion, Lt.* 54° 8′ *N. Lg.* 23° 50′.
* " 22. *Greenwich.* Glaisher.
* " 27. *Greenwich.* Glaisher.
* " 29. *Greenwich.* Glaisher.

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*Jan. 14. *Zlatoouste.* Kupffer.[2]
* " 14. *Aylesbury, Whitehaven, Maidstone Hill.*[3]
* " 15. *Hartwell, England.* Glaisher.
* " 25. *Ship Creole, Lt.* 41° 28′ *N. Lg.* 65° 9′.
*Feb. 18. *Wakefield, England.* Glaisher.
* " 19. *Ship Liverpool, Lt.* 50° 43′ *N. Lg.* 31°.
* " 19. *Stone, Whitehaven, Wakefield.* Glaisher.
* " 20. *Whitehaven, Hartwell, Greenwich.*
* " 21. *At Sea, Lat.* 50° 16′ *N. Long.* 12° *W.*
* " 21. *Hartwell, England.* Glaisher.
* " 22. *Holkham, Aylesbury, Stone.* Glaisher.
* " 22. *Norwich, Newcastle, Greenwich.*
* " 23. *Whitehaven, Hartwell.* Glaisher.
* " 24. *At Sea, Lt.* 42° 45′ *N. Lg.* 54° 8′ *W.*
* " 27. *Catherinebourg.* Kupffer.
*March 14. *Albion Mines, Nova Scotia.* Lefroy.
* " 15. *Lower Saginaw, Michigan.* Smith. Rec.

[1] Wochenschrift für Astronomie, Meteorologie etc., II. 385.
[2] Annal. de l'Observ. Physique Centrale de Russie, 1849. Suppl. pp. 125 et 459.
[3] The Marriages, Births, and Deaths in England. No. 1, p. 31.

*March 16. *Ceres, Penn. New York State.* Smith. R.
* " 17. *Fryeburg and Oldtown, Maine.*
* " 17. *Dublin and Londonderry, N. H.*
* " 17. *Erie, Penn. Indiana.* [*Mich.*
* " 17. *Detroit, Lower Saginaw, Battle Creek,*
* " 17. *Milwaukie and Emerald Grove, Wisc.*
* " 17. *Middlebury, Madrid, Oberlin, Ohio.*[2]
* " 18. *Albion Mines, N. S.* Lefroy.
* " 18. *Fryeburg, Oldtown, Bucksport, Maine.*
* " 18. *Concord, Londonderry, Dublin, N. H.*
* " 18. *East Douglass, Mass? Brattleboro, Vt.*
* " 18. *New London, Conn. Gettysburg, Lima,*
* " 18. *Lancaster, Morrisville, Canonsburg, Pa.*
* " 18. *Newark, Bloomfield, N. J. Washington.*
* " 18. *Chestertown, Md. Alexandria, Leesburg, Va.*
* " 18. *Granville, Middlebury, Oberlin, Summit.*
* " 18. *Laporte, Indiana. Southport, Wisconsin.*
* " 18. *Detroit, Emerald Grove, Lower Saginaw,*
* " 18. *Battle Creek, Mich.*[2]
* " 18. *Stone, England.* Glaisher.
* " 19. *Albion Mines, N. S.* Lefroy.
* " 19. *Detroit, Mich.? Lambertville, N. J.*
* " 25. *Erie, Pa., Brest, Mich., Oberlin, Ohio.*
* " 26. *Lower Saginaw, Michigan.* Smith. Rec.
* " 27. *Detroit, Michigan.* Smith. Records.
* " 28. *Detroit, Michigan.* Smith. Records.
" 29. *Middlebury, Summit, Ohio.* Smith. Rec.
* " 30. *Oberlin, Ohio.* Smith. Records.
* " 31. *Albion Mines, N. S.* Lefroy.
*April 1. *Albion Mines, N. S.* Lefroy.
* " 2. *Lima, Penn.* Smith. Records.
* " 13. *Freeport, Penn. Keene, Ohio.* Smith. Rec.
* " 13. *Battle Creek, Brest; Detroit, Lower Sag.*
* " 13. *Southport, Emerald Grove, Milwaukie.*
* " 13 *Waukegan, Illinois.* Smith. Records.
* " 14. *Windham, Maine. Keene, Ohio.*
* " 14. *Battle Creek, Brest, Detroit, Mich.*
* " 14. *Waukegan, Illinois.* Smith. Records.
* " 17. *Patten, Maine.* Smith. Records.
* " 18. *Patten, Maine.* Smith. Records.
* " 20. *Albion Mines, N. S.* Lefroy.
* " 20. *Middletown, Conn.* Smith. Records.
* " 20. *Emerald Grove, Wisc.* Smith. Rec.
* " 21. *Windham, Maine. Battle Creek, Mich.*
* " 21. *Emerald Grove, Wisc.* Smith. Records.
* " 22. *Lima, Penn.* Smith. Records.
* " 24. *Middletown, Conn.* Smith. Records.
* " 25. *Wooster, Ohio.* Smith. Records.
*April 26. *Albion Mines, N. S.* Lefroy.
* " 26. *Wooster, Ohio.* Smith. Records.
* " 27. *Wooster, Ohio.* Smith. Records.
* " 30. *Lima, Penn.* Smith. Records.
*May 1. *Detroit, Michigan.* Smith. Records.
* " 6. *Fryeburg, Maine.* Smith. Records.
" 8. *Detroit, Michigan.* Smith. Records.
* " 11. *Detroit, Michigan.* Smith. Records.
* " 12. *Bangor, Windham, Maine.*
* " 12. *Dublin, N. H. Middlebury, Vt.*
* " 12. *Richmond, Mass., Hartford, Conn.*
* " 12. *Lower Saginaw, Mich., Emerald Isle.*
" 13. *Bangor, Maine.* Smith. Records.
" 13. *Ship Liverpool, Lt.* 51° 15′ *N. Lg.* 13°.[2]
" 15. *Bangor, Maine.* Smith. Records.
" 16. *Windham, Maine. Burlington, Vt.*
* " 17. *Bangor, Maine. Lima, Penn.* Smith. R.
" 18. *Battle Creek, Mich.* Smith. Records.
* " 25. *Bangor, Maine. Manchester, Penn.*
" 30. *Manchester, Penn.* Smith. Records.
" 31. *Stone, England.* Glaisher.[1]
June 4. *Lake Nipigon.* Lefroy.
* " 10. *Lake Nipigon.* Lefroy.
* " 10. *Burlington, N. J.* Smith. Records.
* " 12. *Emerald Grove, Wisc.* Smith. Records.
" 15. *Stone, England.* Glaisher.
* " 17. *Wellsboro, Penn. Alton, Illinois.*[2]
* " 18. *Bangor, Maine. Alton, Illinois.*[2]
* " 19. *Bangor, Maine.* Smith. Records.
* " 20. *Bangor, Me. Alton, Ill. Emerald Isle.*[2]
* " 22. *Freeport, Penn.* Smith. Records.
" 23. *Laporte, Indiana.* Smith. Records.
* " 24. *Manchester, Penn.* Smith. Records.
* " 26. *Latimer, England.* Glaisher.
" 30. *Alleghany Co., Penn.* Smith. Records.
" 30. *Latimer, England.* Glaisher.
July 1. *Alleghany Co., Penn.* Smith. Records.
* " 9. *Battle Creek, Mich. Milwaukie, Wisc.*[2]
* " 10. *Alleghany Co., Penn.* Smith. Records.
" 11. *Manchester and Alleghany Co., Penn.*
" 11. *Ship Southampton, Lt.* 46° *N. Lg.* 33°.[2]
* " 12. *Lancaster, Manchester, Penn.* Smith. R.
* " 13. *Lancaster, Penn.?* Smith. Records.
" 19. *Albion Mines, N. S.?* Lefroy.
" 19. *Burlington, Vt.* Smith. Records.
* " 22. *Bangor, Maine. Amherst, Mass.*

[1] Births, Deaths, and Marriages registered in England, No. 2, p. 31. [2] Smithsonian Records in Manuscript.

*July 22. *Hartford, Conn. Battle Creek, Mich.*[1]
* " 23. *Bangor, Maine. Amherst, Mass. Hartford.*
* " 23. *Gettysburg, Lancaster, Penn. Bloomfield.*
* " 23. *Emerald Grove, Wisc.* Smith. Records.
* " 23. *Wooster, Ohio. Battle Creek, Mich.*
* " 24. *Bangor, Maine. Hartford, Conn.*[1]
* " 31. *Albion Mines, N. S.?* Lefroy.
* " 31. *Battle Creek, Mich.* Smith. Records.
Aug. 9. *Albion Mines, N. S.* Lefroy.
" 9. *Emerald Grove, Wisc.* Smith. Records.
" 10. *Lancaster, Penn.* Smith. Records.
" 11. Wolf.[2]
* " 12. *Burlington, Vt. Manchester, Wellsboro, Pa.*[1]
* " 13. *Burlington, Vt.* Smith. Records.
* " 13. *Lancaster, Wellsboro, etc., Penn.*
* " 13. *Milwaukie and Emerald Grove, Wisc.*[1]
" 16. *Ship Constellation, Lt.* 40° 58′ *N. Lg.* 63°.[1]
* " 18. *Albion Mines, N. S.* Lefroy.
* " 18. *Whitehaven, England.* Glaisher.
* " 20. *Burlington, Vt.* Smith. Records.
* " 21. *Burlington, Vt.* Smith. Records.
* " 22. *Bangor, Maine.* Smith. Records.
" 24. *Polar Sea, Lat.* 69° *N. Long.* 137° *W.*
*Sept. 3. *Fryeburg, Hampden, Maine.* [Hooper.
* " 3. *Latimer, England.* Glaisher.
" 5. *Peel's River, Fort Hooper.* Lefroy.
* " 6. *Peel's River, Fort Hooper.* Lefroy.
* " 7. *Windham, Me. Amherst, Richmond, Mass.*
* " 7. *Battle Creek, Michigan.* Smith. Records.
* " 8. *Burlington, Vt.* Smith. Records.
* " 8. *Albion Mines, N. S.* Lefroy.
* " 9. *Bangor, Windham, Maine. Burlington, Vt.*
* " 9. *Richmond, Mass. Alleghany Co., Penn.*[1]
" 10. *Bangor, Maine.* Smith. Records.
" 11. *Peel's River Fort.* Lefroy.
* " 12. *Albion Mines, N. S.* Lefroy. *Amherst.*
* " 12. *Bucksport, Maine. Burlington, Vt.*[1]
* " 12. *Erie, Gettysburg, Penn. Battle Creek.*
* " 13. *Easton, Penn.* Smith. Records.
" 15. *Oldtown, Maine.* Smith. Records.
* " 16. *Peel's River Fort.* Lefroy. *Burlington, Vt.*
* " 16. *Concord, Dublin, Londonderry, N. H.*
* " 16. *Manchester, Penn. Newark, Delaware.*[1]
* " 16. *Stonyhurst, England.* Glaisher.
* " 17. *Peel's River Fort.* Lefroy. *Bangor, Me.*
* " 17. *Concord and Londonderry, N. H.*[1]
* " 18. *Bangor, Bucksport, Steuben, Windham, Me.*
* " 18. *Montpelier, Burlington, Vt. Dublin, N. H.*

[2] Bull. de l'Acad. Brux. XVI.

*Sept. 18. *Mendon, Richmond, Mass.*
* " 18. *Gettysburg, Penn. Charlotteville, Va.*[1]
* " 19. *Peel's River.* Lefroy.
* " 19. *Bangor, Maine. Alleghany Co., Penn.*[1]
* " 23. *Lima, Penn.* Smith. Records.
* " 24. *Albion Mines, N. S.* Lefroy.
*Oct. 7. *Emerald Grove, Wisc.* Smith. Records.
" 12. *Freeport, Maine.* Smith. Records.
* " 13. *Fort Simpson?* Lefroy.
* " 13. *Bangor, Fryeburg, Maine. Hartford.*
* " 13. *Burlington, Vt. Mendon, Mass.*[1]
* " 13. *Battle Creek, Mich. Emerald Grove, Wisc.*
* " 14. *Fort Simpson, Albion Mines.* Lefroy.
* " 14. *Windham, Maine. Dublin, N. H.*
* " 14. *Richmond, Mass. Newark, Del.*
* " 14. *Middletown, Salisbury, Hartford, Conn.*
* " 14. *Lima, Morrisville, Penn.* Smith. Records.
* " 15. *Fort Norman?* Lefroy.
* " 15. *Cape Small Point, Me.* Smith. Records.
* " 15. *Middletown, Conn. Wellsboro, Penn.*
* " 15. *Cambridge, Stonyhurst, Engl.* Glaisher.
* " 18. *Fort Simpson.* Lefroy.
* " 18. *Montpelier, Vt. Brest, Michigan.*[1]
* " 19. *Albion Mines, N. S.* Lefroy.
* " 19. *Montpelier, Vt. Richmond, Mass.*[1]
* " 21. *Fort Simpson.* Lefroy.
* " 21. *Burlington, Montpelier, Vt. Battle Creek.*
* " 22. *Greenwich, Cardington, Engl.* Glaisher.
* " 29. *Lake Nipigon.* Lefroy.
*Nov. 10. *Fort Norman?* Lefroy.
* " 12. *Fort Simpson.* Lefroy.
* " 14. *Fort Simpson. Michipicoton.* Lefroy.
* " 14. *Bangor, Maine. Burlington, Vt.*[1]
* " 15. *Between Fort Norman and Bear Lake.*
* " 15. *Burlington, Vt.* Smith. Records.
" 16. *Fort Norman?* Lefroy.
* " 17. *Grand Rapids, Michigan.* Smith. Records.
* " 19. *Michipicoton.* Lefroy.
* " 20. *Michipicoton.* Lefroy.
" 23. *Michipicoton.* Lefroy.
" 24. *Albion Mines, N. S.* Lefroy.
* " 27. *Manchester, Penn. Mount Tabor, Ohio.*[1]
" 30. *Fort Simpson, Albion Mines, N. S.* Lefroy.
" 30. *Ship New York, Lt.* 42° 41′ *N. Lg.* 57°.[1]
*Dec. 7. *Fort Simpson, Michipicoton.* Lefroy.
* " 7. *Bangor, Maine. Amherst, Mass.*[1]
* " 7. *Hartford, Conn. Mt. Tabor, Ohio.*
* " 10. *Michipicoton.* Lefroy.

[1] Smithsonian Records in Manuscript.

*Dec. 12. *Burlington, Vt. Emerald Grove, Wisc.*
* " 17. *Burlington, Vt.* Smith. Records.
* " 18. *Fort Simpson.* Lefroy.
* " 18. *Bangor, Windham, Me. Freeport, Penn.*[2]
* " 19. *Fort Simpson, Lake Nipigon.* Lefroy.
* " 20. *Michipicoton.* Lefroy.
* " 21. *Bear Lake?* Lefroy.
* " 21. *Bangor, Maine. Londonderry, N. H.*[2]
" 23. *Lake Nipigon.* Lefroy.
* " 25. *Bear Lake?* Lefroy.

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*Jan. 1. *Easton, Penn.* Smith. Records.
* " 3. *Fort Simpson, Michipicoton.* Lefroy.
" 5. *Greenwich.* Glaisher.[1]
" 7. *Bear Lake?* Lefroy.
* " 9. *Michipicoton, Toronto.* Lefroy.
* " 12. *Bangor, Maine. Lima, Penn.*[2]
* " 18. *Fort Simpson, Toronto, St. Johns.* Lefroy.
* " 18. *Albion Mines, London, C. W.* Lefroy.
* " 18. *Lima, Penn. Monroe, Ill.*
* " 18. *Ogdensburg, N. Y. Salisbury, Conn.*
* " 18. *At Sea, Roscius, Lt. 50° N. Lg. 24° W.*[2]
* " 19. *Toronto.* Lefroy. *Bangor.* Smith. Rec.
* " 19. *Lima, Pa. New York.* Smith. Records.
" 20. *Halifax.* Lefroy.
" 21. *Dayton, Ohio.* Smith. Records.
* " 25. *Montreal.* Lefroy.
* " 27. *Fort Simpson.* Lefroy. *Lima, Pa.*[2]
" 30. *Bear Lake?* Lefroy.
" 30. *Hartwell, England.* Glaisher.
* " 31. *Bear Lake? Michipicoton.* Lefroy.
* " 31. *Ship Ashburton from Liverpool to N. Y.*[2]
*Feb. 1. *Albion Mines, Fort Simpson, Montreal.*
* " 1. *Bangor, Maine. Battle Creek, Mich.*
* " 1. *Burlington, Vt. Madrid, Ogdensburg, N. Y.*
* " 1. *Kapposia, Minnesota. Windsor, Conn.*[2]
* " 2. *Michipicoton, Lake Nipigon.* Lefroy.
* " 3. *Lake Nipigon, Michipicoton.* Lefroy.
* " 3. *Ship Aberdeen Lat. 53° 30′ N. Lg. 13°.*[2]
* " 4. *Fort Simpson.* Lefroy.
* " 4. *Ceres, Penn.* Smith. Records.
" 5. *Kingston, Toronto, St. Johns.* Lefroy.
* " 6. *Bear Lake? Quebec, Montreal.* Lefroy.
* " 6. *Albion Mines, Halifax.* Lefroy.
* " 6. *Ogdensburg, N. Y.* Smith. Records.
* " 6. *Whitehaven, Stonyhurst, Durham. Gl.*

1 Marriages, Births, and Deaths registered in England. No. 5, p. 31. 2 Smithsonian Records in Manuscript.

*Feb. 7. *St. Johns.* Lefroy.
" 8. *St. Johns.* Lefroy.
" 9. *Toronto.* Lefroy.
" 9. *Manchester, England.* Glaisher.
* " 10. *Stone, England.* Glaisher.
* " 11. *Bear Lake? London? C. W.* Lefroy.
* " 11. *Duchesse d' Orleans, Lt. 47° N. Lg. 39°* [illegible]
* " 12. *Fort Simpson, Michipicoton.* Lefroy.
* " 12. *Lake Nipigon? Kingston, Toronto.* Le.
* " 12. *Bangor, Maine.* Smith. Records.
* " 12. *Durham, England.* Glaisher.
* " 13. *Fort Simpson, Halifax, St. Johns?* Le.
* " 14. *Lake Nipigon.* Lefroy.
* " 14. *Lima, Penn.* Smith. Records.
* " 15. *Windsor, Conn.* Smith. Records.
* " 16. *Kingston, London, Halifax.* Lefroy.
* " 16. *Fort Porter, Ogdensburg, N. Y.*[2]
* " 17. *Quebec.* Lefroy.
* " 18. *Lake Nipigon, Michipicoton.* Lefroy.
" 19. *Fort Porter, N. Y.* Smith. Records.
" 21. *Fort Simpson.* Lefroy.
" 21. *Philadelphia.* Smith. Records.
* " 22. *Montreal, Kingston, London.* Lefroy.
* " 23. *Halifax, St. Johns.* Lefroy.
* " 26. *Philadelphia.* Smith. Records.
" 27. *Fort Simpson.* Lefroy.
*March 1. *Lake Nipigon, Fort Simpson.* Lefroy.
* " 1. *Albion Mines, N. S. St. Johns.* Lefroy.
* " 1. *Bangor, Maine. Windsor, Conn.*[2]
* " 1. *Emerald Grove, Wisc.* Smith. Records.
* " 1. *Battle Creek, Mich.* Smith. Records.
* " 1. *Windham, Me. Monroe, Ill.* Smith. R.
* " 3. *Quebec, Albion Mines, N. S.* Lefroy.
* " 3. *Halifax, St. Johns.* Lefroy.
* " 3. *Steuben, Windham, Maine. Burlington, Vt.*
* " 4. *Lake Nipigon, Quebec, Montreal.* Lefroy.
* " 4. *Toronto, London, Halifax, St. Johns.* Le.
* " 4. *Biddeford, Bangor, Thomaston, Maine.*
* " 4. *Burlington, Vt. Windsor, Middletown,*
* " 4. *Hartford, Conn. Southwick, Mass.*
* " 4. *Emerald Grove, Wisc.* Smith. Records.
* " 5. *Fort Simpson, Lake Nipigon.* Lefroy.
* " 5. *Bangor, Maine.* Smith. Records.
* " 9. *Quebec.* Lefroy.
* " 9. *Bangor, Steuben, Maine. Dover, Iowa.*
* " 9. *Alleghany Co., Penn. Battle Creek. Mich.*
* " 9. *Emerald Grove, Kenovia, Milwaukie.*[2]
* " 9. *Whitehaven, England.* Glaisher.
* " 10. *Fort Simpson, Kingston, London.* Lefroy.

*	March	10.	*Thomaston, Maine.* Smith. Records.
*	"	10.	*Lima, Morristown, Pa.* Smith. Records.
*	"	10.	*Stonyhurst, Nottingham, Engl.* Glaisher.
*	"	11.	*Fort Simpson; Lake Nipigon.* Lefroy.
*	"	11.	*Michipicoton, Montreal.* Lefroy.
*	"	11.	*Halifax, Albion Mines.* Lefroy.
*	"	11.	*Windsor, Hartford, Conn.* Smith. Rec.
*	"	11.	*Albion, Chautauque, Fort Porter, N. Y.*
*	"	11.	*Seneca Falls.* Smith. Records.
*	"	11.	*Stonyhurst, Greenwich, Engl.* Glaisher.
*	"	12.	*Halifax.* Lefroy.
*	"	12.	*Southwick.* Smith. Records.
*	"	13.	*Fort Simpson, St. Johns.* Lefroy.
*	"	15.	*Michipicoton, Lake Nipigon.* Lefroy.
*	"	15.	*Chautauque, N. Y.* Smith. Records.
*	"	16.	*Lake Nipigon, Michipicoton.* Lefroy.
*	"	16.	*St. Johns, Toronto? Montreal.* Lefroy.
*	"	16.	*Halifax, Albion Mines.* Lefroy.
*	"	16.	*Steuben, Thomaston, Me.* Smith. Rec.
*	"	16.	*Burlington, Vt.* Smith. Records.
	"	19.	*Fort Porter, N. Y.* Smith. Records.
	"	20.	*Fort Porter, N. Y.* Smith. Records.
*	"	21.	*Fort Porter, N. Y.* Smith. Records.
	"	24.	*Toronto.* Lefroy.
	"	24.	*Fort Porter, Somerville, N. Y.* Smith. R.
*	"	25.	*Lima, Penn.* Smith Records.
*	"	26.	*Somerville, Penn.* Smith. Records.
	"	27.	*Rose Hill, near Oxford, Engl.* Glaisher.
	"	28.	*Stone, Engl.* Glaisher.
*	"	29.	*Leeds, Stone, Engl.* Glaisher.
	"	30.	*Windham, Maine.* Smith. Records.
*	"	31.	*Lake Nipigon, Montreal.* Lefroy.
*	"	31.	*Toronto, Halifax, St. Johns.* Lefroy.
*	"	31.	*Londonderry, N. H. Steuben, Maine.*
*	"	31.	*Southwick, Amherst, Mass.* Smith. Rec.
*	"	31.	*Hartford, Windsor, Conn.* Smith. Rec.
*	"	31.	*Lima, Gettysburg, Pa.* Smith. Records.
*	April	1.	*Albion Mines, Toronto, Halifax.* Lefroy.
*	"	1.	*Hartford, Conn.* Smith. Records.
	"	5.	*Whitehaven, Engl.* Glaisher.
*	"	6.	*Michipicoton, Kingston.* Lefroy.
*	"	6.	*Toronto, London.* Lefroy.
*	"	6.	*Quebec, Montreal.* Lefroy.
*	"	6.	*Biddeford, Oldtown, Patten, &c. Maine.*
*	"	6.	*Dublin, Concord, Londonderry, N. H.*
*	"	6.	*Burlington, Montpelier, Brattleboro, Vt.*
*	"	6.	*Richmond, Amherst, Mass.*
*	"	6.	*Litchfield, Salisbury, Conn.*
*	"	6.	*Albion, N. Y. Bloomfield, N. J.*
*	April	6.	*Morrisville, Freeport, Lancaster,*
*	"	6.	*Manchester, Pittsburg, Burlington,*
*	"	6.	*Gettysburg, Lima, Alleghany Co., Penn.*
*	"	6.	*Battle Creek, Burr Oak, Detroit, Mich.*
*	"	6.	*Milwaukie, Wisc. Augusta, Illinois.*[1]
*	"	6.	*Durham, England.* Glaisher.
*	"	7.	*Lake Nipigon, Michipicoton.* Lefroy.
*	"	7.	*Quebec, Montreal, London.* Lefroy.
*	"	7.	*Halifax, Albion Mines.* Lefroy.
*	"	7.	*Thomaston, Biddeford, Bucksport,*
*	"	7.	*Oldtown, Maine. Londonderry, N. H.*
*	"	7.	*Montpelier, Burlington, Vt.*
*	"	7.	*Amherst, Richmond, Southwick, Mass.*
*	"	7.	*Litchfield, Salisbury, Conn.*
*	"	7.	*Burlington, Penn. Bloomfield, N. J.*
*	"	7.	*Battle Creek, Mich.* Smith Records.
*	"	8.	*Lake Nipigon, Michipicoton.* Lefroy.
*	"	8.	*Montreal, Toronto.* Lefroy.
*	"	8.	*Bucksport, Oldtown, Maine.*
*	"	8.	*Whithead, Thomaston, Maine.*
*	"	8.	*Lima, Penn. Milwaukie, Wisc.*
*	"	8.	*Battle Creek, Detroit, Mich.* Smith. Rec.
*	"	9.	*Lake Nipigon, Toronto.* Lefroy.
	"	11.	*Lake Nipigon, Michipicoton.* Lefroy.
	"	11.	*Montreal, Albion Mines.* Lefroy.
	"	11.	*London, Halifax.* Lefroy.
	"	11.	*Ogdensburg, N. Y.* Smith. Records
	"	13.	*Lake Nipigon.* Lefroy.
*	"	14.	*Lake Nipigon, Kingston.* Lefroy.
*	"	15.	*Michipicoton, Montreal.* Lefroy.
*	"	15.	*London, Toronto, St. Johns.* Lefroy.
*	"	15.	*Burlington, Vt.* Smith. Records.
*	"	15.	*Thomaston, Maine.* Smith. Records.
	"	16.	*Lake Nipigon, Michipicoton.* Lefroy.
	"	16.	*Montpelier, Vt. Easton, Penn.* Lefroy
*	"	17.	*Easton, Penn.* Lefroy.
	"	18.	*Easton, Penn.* Smith. Records.
*	"	19.	*Kingston.* Lefroy.
	"	20.	*Halifax.* Lefroy.
	"	23.	*Somerville, N. Y.* Smith. Records.
	"	27.	*Lima, Penn.* Smith. Records.
*	"	28.	*Michipicoton, Quebec.* Lefroy.
	"	29.	*Easton, Penn.* Smith. Records.
*	"	30.	*Fort Porter, N. Y.* Smith. Records.
	May	2.	*Bear Lake?* Lefroy.
*	"	3.	*Albion Mines, N. S.* Lefroy.
	"	6.	*Ship Edgar, Lat.* 46° 58′. *Long.* 63° 50′.[1]

[1] Smithsonian Records in Manuscript.

*	May	7.	*Quebec, Montreal, Toronto.* Lefroy.
*	"	7.	*Whitehead, Fryeburg, Oldtown, Maine.*
*	"	7.	*Burlington, Montpelier, Vt.*
*	"	7.	*Dublin, Concord, N. H.*
*	"	7.	*Amherst, Richmond, Mass.*
*	"	7.	*Hartford, Litchfield, Salisbury, Conn.*
*	"	7.	*Lima, Penn.* Smith. Records.
	"	8.	*Bear Lake? Toronto.* Lefroy.
	"	8.	*Ship Roscius, Lt.* 40° 2′ *N. Lg.* 68° 6′ *W.*[1]
*	"	9.	*Toronto, London?* Lefroy.
*	"	10.	*Montreal?* Lefroy.
*	"	10.	*Thomaston, Maine.* Smith. Records.
*	"	12.	*Michipicoton, Albion Mines.* Lefroy.
*	"	12.	*Toronto, Halifax.* Lefroy.
*	"	12.	*Thomaston, Maine.* Smith. Records.
*	"	12.	*Bloomfield, N. J. Lima, Penn.* Smith. R.
*	"	12.	*Aylesbury, Oxford, England.* Glaisher.
*	"	12.	*Stonyhurst, Durham, England.* Glaisher.
*	"	12.	*Toronto? Halifax.* Lefroy.
*	"	13.	*Albion Mines, St. Johns.* Lefroy.
*	"	13.	*Old Town, Thomaston, Me.* Smith. Rec.
*	"	18.	*Albion Mines.* Lefroy.
	"	20.	*St. Johns?* Lefroy.
	"	25.	*Halifax.* Lefroy.
	"	28.	*Michipicoton?* Lefroy.
	"	29.	*St. Johns?* Lefroy.
	June	1.	*Michipicoton?* Lefroy.
	"	3.	*Montreal.* Lefroy.
	"	5.	*Michipicoton, Halifax,* Lefroy.
	"	5.	*Nottingham, England.* Glaisher.
*	"	7.	*Montreal, Halifax, St. Johns.* Lefroy.
	"	8.	*Michipicoton.* Lefroy.
	"	8.	*Quincy, Illinois.* Smith. Records.
	"	8.	*Ship Ashburton, Lt.* 42° 57′ *N. Lg.* 41° 48′.
	"	9.	*Halifax?* Lefroy.
	"	9.	*Quincy, Illinois.* Smith. Records.
*	"	10.	*Michipicoton.* Lefroy.
	"	11.	*Windsor, Conn. Clocksville, N. Y.*
	"	11.	*Morrisville, Penn.* Smith. Records.
	"	12.	*Halifax.* Lefroy.
	"	12.	*Chautauque, N. Y.* Smith. Records.
*	"	13.	*St. Johns.* Lefroy.
*	"	13.	*Madrid, Somerville, Manchester, N. Y.*
*	"	13.	*Manchester, Penn.* Smith. Records.
*	"	13.	*Hartwell House, Oxford.* Glaisher.
*	"	13.	*Rose Hill, England.* Glaisher.
	"	14.	*Michipicoton, Halifax.* Lefroy.
	"	15.	*Halifax?* Lefroy.

[1] Smithsonian Records in Manuscript.

*	June	16.	*St. Johns?* Lefroy.
	"	19.	*Moose Factory.* Lefroy.
	"	20.	*Moose Factory.* Lefroy.
*	"	22.	*Moose Factory.* Lefroy.
*	"	23.	*Michipicoton.* Lefroy.
	"	24.	*Moose Factory.* Lefroy.
	"	24.	*Manchester, Penn.* Smith. Records.
	"	26.	*Manchester, England.* Glaisher.
	"	27.	*Moose Factory, Michipicoton.* Lefroy.
	"	27.	*Montreal, Halifax.* Lefroy.
	"	27.	*Chesterfield, Nottingham, Engl.* Glaisher.
	"	28.	*Halifax?* Lefroy.
*	"	29.	*Moose Factory.* Lefroy.
*	"	29.	*Windsor, Conn.* Smith. Records.
	"	30.	*Moose Factory? Toronto?* Lefroy.
*	July	1.	*Moose Factory, St. Johns?* Lefroy.
	"	3.	*Moose Factory, Toronto.* Lefroy.
	"	3.	*Somerville, N. Y.* Smith. Records.
	"	3.	*Manchester, Penn.* Smith. Records.
	"	5.	*Montreal? Albion Mines, Halifax?* Le.
	"	5.	*Norwich, England.* Glaisher.
*	"	6.	*Montreal, Albion Mines, Halifax.*
*	"	6.	*Frederickton, St. John, N. B.* Lefroy.
*	"	7.	*Michipicoton, Matawagomingen,*
*	"	7.	*Montreal, Halifax? Kingston.* Lefroy.
	"	8.	*Moose Factory, Matawagomingen.* Lefroy.
	"	8.	*Michipicoton, Halifax, St. Johns.* Lefroy
*	"	9.	*Moose Factory, Michipicoton.* Lefroy.
*	"	9.	*Albion Mines, Montreal.* Lefroy.
*	"	9.	*Toronto, Kingston, Halifax.* Lefroy.
*	"	9.	*Fort Porter, N. Y.* Smith. Records.
*	"	10.	*Moose Factory, Montreal.* Lefroy.
*	"	10.	*Kingston, Toronto, London.* Lefroy.
*	"	10.	*Frederickton, Halifax.* Lefroy.
*	"	10.	*Burlington, Vt. Richmond, Mass.*[1]
*	"	11.	*Quebec, Montreal.* Lefroy.
*	"	11.	*Kingston, Toronto, London.* Lefroy.
*	"	11.	*Frederickton, St. John, Halifax.* Lefroy.
*	"	11.	*Biddeford, Fryeburg, Maine.*
*	"	11.	*Patten, Thomaston, Maine.*
*	"	11.	*Dublin, N. H. Burlington, Vt.*
*	"	11.	*Randolph, Richmond, Mass.*
*	"	11.	*Alleghany, Freeport, Manchester, Penn.*
*	"	11.	*Oberlin, Ohio. Sandy Spring, Md.*[1]
*	"	12.	*Little Lake, Prairie Portage.* Lefroy.
*	"	12.	*Quebec, Montreal.* Lefroy.
*	"	12.	*Albion Mines, Halifax.* Lefroy.
*	"	12.	*Concord, N. H.* Smith. Records.

[1] Smithsonian Records in Manuscript.

*July 12. *Norwich? Nottingham, Engl.* Glaisher.
" 13. *Moose Factory, Halifax, St. Johns.* Lefroy.
" 13. *Concord, N. H.* Smith. Records.
* " 15. *Moose Factory, Montreal.* Lefroy.
* " 15. *Toronto, Kingston.* Lefroy.
* " 15. *London, St. Johns.* Lefroy.
* " 16. *Montreal, St. Johns?* Lefroy.
" 18. *Moose Factory.* Lefroy.
" 20. *Moose Factory.* Lefroy.
" 20. *Somerville, N. Y.* Smith. Records.
" 21. *Moose Factory.* Lefroy.
" 21. *Alleghany, Penn.* Smith. Records.
" 22. *Moose Factory.* Lefroy.
" 22. *Litchfield, Conn.* Smith. Records.
" 24. *Moose Factory.* Lefroy.
" 25. *Moose Factory.* Lefroy.
" 26. *Moose Factory.* Lefroy.
" 27. *Winnipeg River, Moose Factory.* Lefroy.
" 27. *Quebec, Montreal, Halifax.* Lefroy.
" 27. *St. Johns, Frederickton, N. B.* Lefroy.
" 27. *Ship Garland, Lat.* 51° 25′ *N. Long.* 17° *W.*
" 27. Smithsonian Institution.
" 28. *Gd. Rapids, Winnipeg River, Moose Factory.*
" 28. *Michipicoton, St. Johns.* Lefroy.
" 28 ? *Manchester, Penn. Somerville, N. Y.*
" 28. *At Sea, Lat.* 51° 36′ *N. Long.* 13° 47′ *W.*
" 28. Smithsonian Records.
" 29. *Moose Factory, Matawagomingen.* Lefroy.
" 29. *Montreal? Toronto.* Lefroy.
" 29. *Kingston, Halifax.* Lefroy.
" 31. *Moose Factory, Quebec.* Lefroy.
Aug. 1. *Moose Factory, Montreal.* Lefroy.
" 1. *Toronto, St. Johns.* Lefroy.
* " 2. *Moose Factory.* Lefroy.
* " 4. *Moose Factory.* Lefroy.
" 5. *Moose Factory.* Lefroy.
* " 6. *Moose Factory.* Lefroy.
* " 6. *Trois Isles near Montreal.* Lefroy.
* " 6. *Stone, Engl.* Glaisher.
* " 7. *Moose Factory, Montreal.* Lefroy.
* " 7. *Fredericton, N. B.* Lefroy.
* " 7. *Whithead, Maine.* Smith. Records.
* " 7. *Burlington, Vt.* Smith. Records.
" 8. *Moose Factory, Halifax.* Lefroy.
" 8. *Burlington, Vt.* Smith. Records.
* " 9. *McIntosh Island, Moose Factory.* Lefroy.
* " 9. *Matawagomingen, Quebec.* Lefroy.
* " 9. *Montreal, Toronto, Kingston.* Lefroy.

*Aug. 9. *London, Halifax, St. Johns.* Lefroy.
* " 9. *Alleghany Co., Manchester, Penn.*
* " 9. Smithsonian Records.
* " 9. *Emerald Grove, Wisc.* Smith. Records.
* " 10. *McIntosh Island, Matawagomingen.*
* " 10. *Michipicoton, Quebec, Toronto.* Lefroy.
* " 10. *Frederickton, St. Johns, Halifax.* Lefroy.
* " 10. *Litchfield, Conn. Aztalan, Wisc.*
* " 10. *At Sea, Lat.* 42° 54′ *N. Long.* 65° *W.*
* " 10. Smithsonian Records.
" 11. *Matawagomingen.* Lefroy.
" 11. *Quebec, Montreal.* Lefroy.
" 11. *Alleghany Co., Penn.* Smith. Records.
" 11. *At Sea, Lat.* 45° 20′ *N. Long.* 66° 40′ *W.*
" 11. Smithsonian Institution.
* " 12. *Moose Factory, Halifax? St. Johns.* Lefroy.
* " 12. *Alleghany, Penn.* Smith. Records.
" 13. *Moose Factory.* Lefroy.
" 13 *Whithead, Maine. Smithville, N. Y.*
" 13. *Manchester, Penn.* Smith. Records.
* " 15. *Moose Factory? Toronto, Halifax.* Lefroy.
* " 16. *Moose Factory, Matawagomingen.* Lefroy.
* " 16. *Quebec, Montreal? Toronto.* Lefroy.
* " 16. *Halifax, St. Johns, Albion Mines.* Lefroy.
* " 16. *Manchester, Penn.* Smith. Records.
* " 17. *Moose Factory, Matawagomingen.* Lefroy.
* " 17. *Toronto, Kingston, London.* Lefroy.
* " 18. *Quebec, Montreal.* Lefroy.
* " 18. *Kingston, Halifax.* Lefroy.
" 19. *Cumberland Lake, Michipicoton.* Lefroy.
" 21. *Stone, Dunino? Engl.* Glaisher.
* " 23. *Moose Factory, Matawagomingen.* Lefroy.
" 26. *Moose Factory.* Lefroy.
" 26. *Alleghany Co., Penn.* Smith. Records.
" 28. *Moose Factory.* Lefroy.
" 28. *Manchester, Penn.* Smith. Records.
* " 29. *Frog Portage, Moose Factory.* Lefroy.
* " 29. *Fredericton, St. Johns, Halifax.* Lefroy.
* " 30. *Martin's Falls, St. Johns? Halifax.* Lefroy.
" 31. *Martin's Falls, Moose Factory.* Lefroy.
Sept. 1. *Moose Factory, London, Halifax.* Lefroy.
" 2. *Fort Simpson, Moose Factory.* Lefroy.
" 2. *Martin's Falls, Albion Mines.* Lefroy.
" 2. *Kingston, Toronto.* Lefroy.
" 2. *London? Halifax..* Lefroy.
" 2. *Fort Porter, N. Y.* Smith. Records.
* " 3. *Fort Simpson, Moose Factory.* Lefroy.
* " 3. *Quebec, Montreal, Toronto.* Lefroy.

*Sept. 3. *Kingston, London, Halifax.* Lefroy.
* " 3. *Burlington, Vt.* Smith. Records.
* " 3. *Alleghany, Lima, Penn.* Smith. Records.
* " 4. *Fort Simpson, Moose Factory.* Lefroy.
* " 4. *Matawagomingen, Quebec.* Lefroy.
* " 4. *Montreal, Albion Mines.* Lefroy.
* " 4. *Fredericton, Halifax.* Lefroy.
* " 4. *Lima, Penn.* Smith. Records.
* " 5. *Fort Simpson, Below Portage Canot Cassi.*
* " 5. *Moose Factory, Martin's Falls.* Lefroy.
* " 5. *Matawagomingen.* Lefroy.
* " 6. *Portage d'Epingle, Moose Factory.* Lefroy.
* " 6. *Martin's Falls, St. Johns.* Lefroy.
* " 6. *Nottingham, Engl.* Glaisher.
* " 7. *Moose Factory, Martin's Falls.* Lefroy.
* " 7. *Matawagomingen, Quebec.* Lefroy.
* " 7. *Albion Mines, Toronto, London.* Lefroy.
* " 7. *Battle Creek, Mich.* Smith. Records.
* " 7. *Wisconsin.* Smith. Records.
* " 8. *Fort Simpson, Moose Factory.* Lefroy.
* " 8. *Montreal?* Lefroy.
* " 8. *Somerville, N. Y.* Smith. Records.
* " 9. *Fort Simpson, Matawagomingen.* Lefroy.
* " 10. *Fort Simpson, Toronto.* Lefroy.
* " 10. *Fredericton, St. Johns, Halifax.* Lefroy.
* " 10. *Aztalan, Wisc.* Smith. Records.
* " 10. *Nottingham, Engl.* Glaisher.
* " 11. *Belle Fontaine Farm, Wisc.* Smith. Rec.
* " 12. *Halifax.* Lefroy.
* " 12. *Alleghany Co., Penn.* Smith. Records.
* " 13. *Moose Factory, Quebec, Kingston.* Lefroy.
* " 13. *ShipHendrick Hudson, Lt.* 47° *N. Lg.* 58° *W.*
* " 13. Smithsonian Records..
* " 13. *Nottingham, Hawarden, Engl.* Glaisher.
* " 14. *Moose Factory.* Lefroy.
* " 14. *Fredericton, St. Johns.* Lefroy.
* " 14. *Stone, Engl.* Glaisher.
* " 15. *Fort Simpson, Martin's Falls.* Lefroy.
* " 15. *Quebec, Montreal, Albion Mines.* Lefroy.
* " 15. *Burlington, Vt.* Smith. Records.
* " 18. *Moose Factory, St. Johns.* Lefroy.
" 24. *Martin's Falls.* Lefroy.
" 27. *Martin's Falls, St. Johns.* Lefroy.
* " 28. *Martin's Falls, Quebec.* Lefroy.
* " 28. *Albion Mines, Kingston.* Lefroy.
* " 28. *Fredericton, Halifax.* Lefroy.
* " 28. *Battle Creek, Mich.* Smith. Records.
* " 28. *Hartwell House, Engl.* Glaisher.

*Sept. 28. *Hartwell Rectory, Stone, Engl.* Glaisher.
* " 29. *Moose Factory, Martin's Falls.* Lefroy.
* " 29. *Matawagomingen, Kingston.* Lefroy.
* " 29. *Toronto, Michipicoton.* Lefroy.
* " 30. *Martin's Falls, Quebec.* Lefroy.
* " 30. *Montreal, Albion Mines, Toronto.* Lefroy.
* " 30. *London, Fredericton.* Lefroy.
* " 30. *Halifax, St. Johns.* Lefroy.
* " 30. *Burlington, Vt. Fryeburg, Me.* Smith. Rec.
* " 30. *Battle Creek, Mich.* Smith. Records.
*Oct. 1. *Albion Mines, Toronto.* Lefroy.
* " 1. *Halifax, St. Johns.* Lefroy.
* " 1. *Bucksport, Me. Burlington, Vt.* Smith. Rec
* " 1. *Amherst, Mass.* Smith. Records.
* " 1. *Battle Creek, Burr Oak, Mich.* Smith. Rec.
* " 1. *Milwaukie, Wisc.* Smith. Records.
* " 1. *Middletown, Conn. Bloomfield, N. J.*
* " 1. *Lima, Morrisville, Philadelphia, Penn.*
* " 1. *At Sea, ShipHendrick, Lt.* 40° *N. Lg.* 72° *W.*
* " 1. *AtSea, Ship Ashburton, Lt.* 41° *N. Lg.* 65° *W.*
* " 1. Smithsonian Records.
* " 2. *Peel's River, Moose Factory.* Lefroy.
* " 2. *Matawagomingen, Toronto.* Lefroy.
* " 2. *Michipicoton, Martin's Falls.* Lefroy.
* " 2. *Kingston, London, St. Johns.* Lefroy.
* " 2. *Dublin, N. H. Amherst, Mass.* Smith. Rec.
* " 2. *Hartford, Conn. Chautauque, N. Y.*
* " 2. *Bloomfield, N. J. Alleghany, Penn.*
* " 2. *Freeport, Manchester, Morrisville, Penn.*
* " 2. *Battle Creek, Howell, Burr Oak, Mich.*
* " 2. Smithsonian Records.
* " 3. *Fort Confidence, Moose Factory.* Lefroy.
* " 3. *Montreal, Kingston.* Lefroy. [Rec.
* " 3. *Amherst, Mass., Courtland, N. Y.* Smith.
* " 3. *Manchester, Lima, Penn.* Smith. Rec.
* " 3. *At Sea, Ship Yorktown, Lt.* 40° *N. Lg.* 68° *W.*
* " 3. Smithsonian Records.
* " 5. *Moose Factory, Kingston.* Lefroy.
* " 5. *Toronto, Fredericton, Halifax.* Lefroy.
* " 6. *Fort Confidence, Moose Factory.* Lefroy.
* " 6. *Martin's Falls, Quebec.* Lefroy.
* " 6. *Matawagomingen.* Lefroy.
* " 6. *Battle Creek, Burr Oak, Mich.* Smith. Rec.
* " 6. *At Sea, Ship Yorktown, Lt.* 41° *N. Lg.* 55° *W.*
* " 7. *Fort Confidence.* Lefroy.
* " 7. *Quebec, Halifax.* Lefroy.
* " 7. *At Sea, Connecticut, Lt.* 46° *N. Lg.* 38° *W.*
* " 7. Smithsonian Records.

*Oct. 8. *Fort Confidence, London.* Lefroy.
* " 8. *Moose Factory, Martin's Falls.* Lefroy.
* " 8. *Halifax, St. Johns.* Lefroy.
* " 8. *At Sea, Connecticut, Lt. 45° N. Lg. 43° W.*
* " 8. Smithsonian Records.
* " 9. *Fort Confidence, Peel's River.* Lefroy.
* " 9. *Moose Factory.* Lefroy.
* " 9. *Fredericton, St. Johns.* Lefroy.
* " 9. *Burlington, Vt.* Smith. Records.
" 10. *Fort Confidence, Peel's River.* Lefroy.
" 11. *Peel's River.* Lefroy.
" 11. *Alleghany, Penn.* Smith. Records.
* " 12. *Fort Confidence.* Lefroy.
" 13. *Montreal, Toronto.* Lefroy.
* " 14. *Fort Confidence, Halifax.* Lefroy.
* " 14. *Moose Factory.* Lefroy.
* " 14. *Philadelphia, Penn.* Smith. Records.
* " 15. *Fort Confidence, Moose Factory.* Lefroy.
" 16. *Martin's Falls, Fredericton, Halifax.* Lefroy.
* " 17. *Martin's Falls.* Lefroy.
" 18. *Moose Factory.* Lefroy.
" 25. *Fort Confidence.* Lefroy.
* " 27. *Fort Confidence, Montreal.* Lefroy.
* " 27. *Matawagomingen.* Lefroy.
* " 27. *Kingston, Toronto.* Lefroy.
* " 27. *Aztalan, Wisc.* Smith. Records.
* " 27. *Orenbourg.* Anitschkoff.
* " 28. *Fort Confidence, Moose Factory.* Lefroy.
* " 28. *Martin's Falls, Kingston, Toronto.* Lefroy.
* " 28. *London, Halifax, St. Johns.* Lefroy.
* " 29. *Moose Factory, Martin's Falls.* Lefroy.
* " 29. *Quebec, Toronto.* Lefroy.
* " 29. *London, St. Johns.* Lefroy.
* " 29. *Burlington, Vt. Amherst, Mass.* Smith. Rec.
* " 29. *At Sea, Henry Clay, Lt. 43° N. Lg. 43° W.*
* " 29. Smithsonian Records.
" 30. *Matawagomingen, Quebec.* Lefroy.
" 30. *Peel's River, Moose Factory.* Lefroy.
" 30. *Michipicoton, Montreal.* Lefroy.
" 30. *Toronto, London, Halifax.* Lefroy.
" 30. *Fredericton, St. Johns.* Lefroy.
" 30. *Burlington, Vt. Litchfield, Conn.* Smith. Rec.
" 30. *Somerville, Ogdensburg, N. Y.* Smith. Rec.
* " 31. *Peel's River, Moose Factory.* Lefroy.
* " 31. *Martin's Fall.* Lefroy.
Nov. 1. *Fort Confidence.* Lefroy.
" 2. *Peel's River, Moose Factory.* Lefroy.
" 2. *Michipicoton, Martin's Falls.* Lefroy.

Nov. 2. *Albion Mines, Fredericton.* Lefroy.
" 3. *Fredericton.* Lefroy.
" 3. *Orenbourg.* Anitschkoff.
" 4. *At Sea, Ship Henry Clay, Lt. 43°. Lg. 54° W.*
" 4. Smithsonian Records.
" 5. *Fort Good Hope.* Lefroy.
" 6. *Athabasca, Martin's Falls.* Lefroy.
" 6. *Fort Good Hope, Moose Factory.* Lefroy.
" 6. *Matawagomingen, Kingston.* Lefroy.
* " 7. *Fort Confidence, Athabasca.* Lefroy.
* " 7. *Moose Factory, Martin's Falls.* Lefroy.
* " 7. *Fort Good Hope, Michipicoton.* Lefroy.
* " 7. *Quebec, Fredericton.* Lefroy.
* " 7. *Burlington, Vt.* Smith. Records.
* " 8. *Athabasca, Fort Good Hope.* Lefroy.
* " 8. *Moose Factory, Peel's River.* Lefroy.
" 9. *Fort Confidence, Athabasca.* Lefroy.
" 9. *Moose Factory, Martin's Falls, Quebec.*
" 9. *Fort Good Hope, Toronto.* Lefroy. [Rec.
" 9. *Somerville, N. Y. Alleghany Co., Pa.* Smith.
* " 10. *Fort Confidence, Lake Athabasca.* Lefroy.
* " 10. *Moose Factory, Fort Good Hope.* Lefroy.
* " 10. *Martin's Falls, Halifax.* Lefroy.
* " 10. *Toronto, Fredericton.* Lefroy.
* " 10. *Burlington, Vt.* Smith Records.
* " 11. *Fort Chipewyan.* Lefroy
* " 11. *Peel's River, Fort Good Hope.* Lefroy.
* " 11. *Martin's Falls, Quebec.* Lefroy.
* " 11. *Burlington, Vt.* Smith. Records.
" 12. *Lake Athabasca, Martin's Falls.* Lefroy.
" 12. *Fredericton, Quebec.* Lefroy.
" 12. *Alleghany, Penn.* Lefroy.
" 13. *Fort Confidence, Fort Good Hope.* Lefroy.
" 13. *Moose Factory, Peel's River.* Lefroy.
" 13. *Fredericton.* Lefroy.
" 14. *Fort Good Hope, Moose Factory.* Lefroy.
" 15. *Fort Confidence, Lake Athabasca.* Lefroy.
" 16. *Peel's River, Fort Good Hope.* Lefroy.
" 17. *Fort Good Hope, Quebec.* Lefroy.
" 18. *Fort Good Hope, Peel's River.* Lefroy.
" 19. *Fort Confidence, Fort Good Hope.* Lefroy.
" 20. *Fort Good Hope.* Lefroy.
" 21. *Fort Confidence, Fort Good Hope.* Lefroy.
" 21. *Moose Factory?* Lefroy.
" 21. *Alleghany Co., Penn.* Lefroy.
" 24. *Fort Confidence, Peel's River.* Lefroy.
* " 25. *Fort Good Hope, Peel's River.* Lefroy.
* " 25. *Moose Factory, Fredericton.* Lefroy.

Nov. 26. *Athabasca, Fort Good Hope.* Lefroy.
" 26. *Moose Factory, Quebec.* Lefroy.
" 26. *Fredericton, Halifax.* Lefroy.
" 28. *Lake Athabasca.* Lefroy.
" 28. *Hartford, Conn.* Smith. Records.
" 29. *Fort Good Hope, Peel's River.* Smith. Rec.
* " 30. *Fort Confidence, Fort Good Hope.* Lefroy.
* " 30. *Martin's Falls, Peel's River.* Lefroy.
*Dec. 1. *Fort Confidence, Athabasca.* Lefroy.
" 2. *Fort Confidence.* Lefroy.
" 2. *Peel's River, Moose Factory.* Lefroy.
* " 3. *Fort Confidence.* Lefroy.
* " 3. *Somerville, N. Y.* Smith. Records.
* " 3. *Manchester, Alleghany, Pa.* Smith. Rec.
* " 4. *Fort Confidence.* Lefroy.
* " 4. *Lake Athabasca.* Lefroy.
* " 6. *Moose Factory, Martin's Falls.* Lefroy.
* " 6. *Michipicoton.* Lefroy.
* " 8. *Fort Confidence.* Lefroy.
* " 8. *Moose Factory, Martin's Falls.* Lefroy.
" 9. *Lake Athabasca.* Lefroy.
* " 10. *Fort Confidence, Lake Athabasca.* Lefroy.
* " 10. *Moose Factory.* Lefroy.
* " 11. *Fort Confidence, Peel's River.* Lefroy.
* " 11. *Lewis and Pelly, Moose Factory.* Lefroy.
* " 11. *Lake Athabasca.* Lefroy.
" 13. *Fort Confidence.* Lefroy.
* " 15. *Lake Athabasca.* Lefroy.
" 16. *Fort Confidence.* Lefroy.
" 16. *Moose Factory, Martin's Falls.* Lefroy.
" 16. *Newfoundland, Sitka?* Lefroy.
" 19. *Moose Factory.* Lefroy.
" 21. *Moose Factory.* Lefroy.
" 22. *Lake Athabasca, Moose Factory.* Lefroy.
" 22. *Newfoundland.* Lefroy.
* " 23. *Fort Confidence, Peel's River.* Lefroy.
* " 23. *Moose Factory, Lake Athabasca.* Lefroy.
" 24. *Lake Athabasca, Peel's River.* Lefroy.
" 24. *Lewis and Pelly, Quebec.* Lefroy.
" 25. *Fort Confidence, Lake Athabasca.* Lefroy.
* " 26. *Fort Confidence, Peel's River.* Lefroy.
* " 26. *Lake Athabasca, Halifax.* Lefroy.
* " 26. *Concord, N. H.* Smith. Records.
* " 27. *Fort Confidence, Lake Athabasca.* Lefroy.
* " 27. *Martin's Falls, Lewis and Pelly.* Lefroy.
* " 27. *Michipicoton, Quebec.* Lefroy.
* " 27. *Newfoundland.* Lefroy.
* " 28. *Fort Confidence.* Lefroy.
*Dec. 28. *Lake Athabasca, Martin's Falls.* Lefroy.
* " 28. *Halifax, Fredericton.* Lefroy.
* " 29. *Lake Athabasca.* Lefroy.
* " 29. *Peel's River, Moose Factory.* Lefroy.
* " 30. *Lake Athabasca.* Lefroy.
* " 30. *Martin's Falls, Peel's River.* Lefroy.
* " 30. *Moose Factory, Quebec.* Lefroy.
* " 31. *Fort Confidence, Lake Athabasca.* Lefroy.
* " 31. *Moose Factory, Peel's River.* Lefroy.

1851.

*Jan. 1. *Fort Confidence, Martin's Falls.* Lefroy.
* " 1. *Lake Athabasca, Moose Factory.* Lefroy.
* " 1. *Hawarden, Engl.* Glaisher.
* " 2. *Fort Confidence, Moose Factory.* Lefroy.
* " 2. *Lake Athabasca, Martin's Falls.* Lefroy.
* " 3. *Fort Confidence, Moose Factory.* Lefroy.
* " 3. *Lewis and Pelly, Martin's Falls.* Lefroy.
* " 4. *Fort Confidence, Peel's River.* Lefroy.
" 5. *Lake Athabasca.* Lefroy.
" 5. *Lima, Penn.* Smith. Records.
" 5. *Hawarden, Engl.* Glaisher.
" 7. *Fort Confidence, Moose Factory.* Lefroy.
" 9. *Lake Athabasca.* Lefroy.
" 9. *Highfield House, Engl.*[1] Glaisher.
" 10. *Lake Athabasca.* Lefroy.
" 11. *Lake Athabasca.* Lefroy.
" 12. *Lima, Penn.* Smith. Records.
" 13. *Peel's River.* Lefroy.
" 14. *Lake Athabasca.* Lefroy.
* " 15. *Peel's River.* Lefroy.
" 16. *Lake Athabasca.* Lefroy.
" 16. *Albion Mines, Lewis and Pelly.* Lefroy.
" 16. *Quebec, Newfoundland.* Lefroy.
" 16. *Fredericton, Halifax.* Lefroy.
" 18. *Fort Confidence, Moose Factory.* Lefroy.
" 18. *Lake Athabasca, Albion Mines.* Lefroy.
* " 19. *Lake Athabasca, Yoncou.* Lefroy.
* " 19. *Lewis and Pelly, Halifax.* Lefroy.
* " 19. *Newfoundland, Fredericton.* Lefroy.
* " 19. *Attleboro', Mass.* Smith. Records.
* " 20. *Lewis and Pelly, Yoncou.* Lefroy.
* " 20. *Moose Factory.* Lefroy.
* " 21. *Lake Athabasca, Yoncou.* Lefroy.
* " 21. *Peel's River, Moose Factory.* Lefroy.
* " 21. *Quebec, Albion Mines.* Lefroy.
* " 21. *Halifax, Fredericton.* Lefroy.

[1] Near Nottingham.

*Jan. 21. *Attleboro', Bloomfield, N. J.* Smith. Rec.
" 22. *Fort Confidence, Lake Athabasca.* Lefroy.
" 22. *Peel's River, Moose Factory.* Lefroy.
" 22. *Michipicoton, London.* Lefroy.
" 22. *Newfoundland.* Lefroy.
" 22. *Attleboro, Milwaukie.* Smith. Records.
" 22. *Battle Creek, Beloit, Mich.* Smith. Rec.
* " 23. *Lake Athabasca.* Lefroy.
* " 23. *Beloit, Mich.* Smith. Records.
" 24. *Lake Athabasca, Lewis and Pelly.* Lefroy.
" 24. *Moose Factory, Martin's Falls.* Lefroy.
" 24. *Stonyhurst, Dunino, Engl.* Glaisher.
* " 25. *Lake Athabasca.* Lefroy.
* " 25. *Moose Factory, Lewis and Pelly.* Lefroy.
* " 25. *Albion Mines, Martin's Falls.* Lefroy.
* " 26. *Peel's River, Lake Athabasca.* Lefroy.
* " 26. *Yoncou, Lewis and Pelly.* Lefroy.
* " 26. *Moose Factory, Martin's Falls.* Lefroy.
* " 26. *Michipicoton, Fredericton.* Lefroy.
* " 27. *Fort Confidence, Yoncou.* Lefroy.
* " 27. *Peel's River, Lake Athabasca.* Lefroy.
* " 27. *Moose Factory, Martin's Falls.* Lefroy.
* " 27. *Albion Mines, Lewis and Pelly.* Lefroy.
* " 27. *Quebec, Fredericton.* Lefroy.
* " 28. *Lake Athabasca, Yoncou.* Lefroy.
* " 28. *Lewis and Pelly, Martin's Falls.* Lefroy.
* " 28. *Newfoundland.* Lefroy.
* " 29. *Lake Athabasca, Peel's River.* Lefroy.
* " 29. *Moose Factory, Martin's Falls.* Lefroy.
" 30. *Lake Athabasca.* Lefroy.
" 30. *Moose Factory, Peel's River.* Lefroy.
" 30. *Martin's Falls, Halifax.* Lefroy.
" 31. *Peel's River.* Lefroy.
Feb. 1. *Fort Confidence, Peel's River.* Lefroy.
" 1. *Yoncou; Halifax.* Lefroy.
" 1. *Newfoundland.* Lefroy.
" 1. *Highfield House, Stonyhurst.* Glaisher.
" 1. *Dunino, Rose Hill.* Glaisher.
* " 2. *Lake Athabasca.* Lefroy.
" 3. *Lake Athabasca, Peel's River.* Lefroy.
" 3. *Newfoundland.* Lefroy.
" 4. *Fort Confidence, Peel's River.* Lefroy.
" 4. *Moose Factory, Martin's Falls.* Lefroy.
* " 5. *Fort Confidence, Yoncou.* Lefroy.
* " 5. *Lake Athabasca, Peel's River.* Lefroy.
* " 5. *Michipicoton, Moose Factory.* Lefroy.
* " 5. *Quebec, Montreal.* Lefroy.
* " 5. *Toronto, Halifax.* Lefroy.

*Feb. 5. *Burlington.* Smith. Records.
* " 5. *Madrid, Ogdensburg, N. Y.* Smith. Rec.
* " 5. *At Sea, Ship Hendrick Hudson, Lat.* 49° *N.*
* " 5. Smithsonian Records. [*Lg.* 21° 35′ *W.*
* " 5. *North Shields, Durham, Engl.* Glaisher.
* " 6. *Fort Confidence, Lake Athabasca.* Lefroy.
* " 6. *Peel's River, Moose Factory.* Lefroy.
* " 6. *Michipicoton, Martin's Falls.* Lefroy.
* " 6. *Montreal, Halifax.* Lefroy
* " 6. *Newfoundland.* Lefroy.
* " 6. *Rose Hill, Engl.*[1] Glaisher.
* " 7. *Fort Confidence, Yoncou.* Lefroy.
* " 7. *Moose Factory, Martin's Falls.* Lefroy.
* " 7. *Lewis and Pelly.* Lefroy.
* " 7. *Manchester, Penn.* Smith. Records.
* " 7. *Stone, Engl.* Glaisher.
" 8. *Fort Confidence, Lake Athabasca.* Lefroy.
" 8. *Lewis and Pelly.* Lefroy.
* " 9. *Fort Confidence, Lake Athabasca.* Lefroy.
* " 9. *Moose Factory, Newfoundland.* Lefroy.
* " 9. *At Sea, Lat.* 51° *N.? Long.* 28° 50′ *W.?*
* " 9. Smithsonian Records.
" 10. *Lake Athabasca, Moose Factory.* Lefroy.
" 10. *Martin's Falls, Michipicoton.* Lefroy.
" 10. *At Sea, Hendrick Hudson, Lat.* 51° 12′ *N.*
" 10. Smithsonian Records. [*Long.* 28° *W.*
" 11. *Lake Athabasca.* Lefroy.
" 11. *Martin's Falls, Moose Factory.* Lefroy.
" 11. *Jersey, Engl.* Glaisher.
* " 12. *Lake Athabasca, Peel's River?* Lefroy.
* " 12. *Lewis and Pelly, Moose Factory.* Lefroy.
" 14. *Lake Athabasca.* Lefroy.
" 15. *Lake Athabasca, Martin's Falls.* Lefroy.
" 17. *Peel's River.* Lefroy.
" 17. *Somerville, N. Y.* Smith. Records.
" 17. *Philadelphia, Gettysburg, Pa.* Smith. Rec.
" 17. *Detroit, Mich.* Smith. Records.
* " 18. *Fort Confidence, Yoncou.* Lefroy.
* " 18. *Peel's River, Lake Athabasca.* Lefroy.
* " 18. *Martin's Falls, Moose Factory.* Lefroy.
* " 18. *Michipicoton, Albion Mines.* Lefroy.
* " 18. *Quebec, Matawagomingen.* Lefroy.
* " 18. *Montreal, Toronto, London.* Lefroy.
* " 18. *Newfoundland, Halifax.* Lefroy.
* " 18. *Fryeburg, Maine, Dublin, N. H.* Smith. Rec.
* " 18. *Burlington. Vt. Richmond, Mass.* Smith. Rec.
* " 18. *Chautauque, Syracuse, N. Y.* Smith. Rec.

[1] Near Oxford.

*Feb. 18. *Morrisville, &c., Pa. Bloomfield, N. J.*
* " 18. *Sandy Spring, Md.* Smith. Records.
* " 18. *Detroit, Brest, Battle Creek, Mich.* Smith. R.
* " 18. *Emerald Grove, Beloit, Wisc.* Smith. R.
* " 18. *Milwaukie, Taber, Wisc.* Smith. Records.
* " 18. *Green Castle, Ind. Augusta, Ill.* Smith. Rec.
* " 18. *At Sea, Ship Marmion, Lt.* 40° 30′. *Lg.* 67°.
* " 18. Smithsonian Records. [23′ *W.*
* " 18. *Grantham, Stone, Engl.* Glaisher.
* " 19. *Fort Confidence, Martin's Falls.* Lefroy.
* " 19. *Halifax, Abion Mines.* Lefroy.
* " 19. *Newfoundland.* Lefroy.
* " 19. *Burlington, Vt. Somerville, N. Y.* Smith. R.
* " 19. *Hawarden, Durham, Dunino.* Glaisher.
* " 20. *Peel's River, Lewis and Pelly.* Lefroy.
* " 20. *Martin's Falls, Moose Factory.* Lefroy.
* " 20. *Michipicoton.* Lefroy.
* " 20. *Hartford, Conn.* Smith. Records.
* " 20. *Hawarden, Engl.* Glaisher.
* " 21. *Fort Confidence, Peel's River.* Lefroy.
* " 21. *Lewis and Pelly, Moose Factory.* Lefroy.
* " 21. *Lake Athabasca.* Lefroy.
" 22. *Lake Athabasca, Yoncou.* Lefroy.
" 22. *Peel's River, Kingston.* Lefroy.
* " 23. *Fort Confidence, Peel's River.* Lefroy.
* " 23. *Lake Athabasca, Lewis and Pelly.* Lefroy.
* " 23. *Durham, Engl.* Glaisher.
* " 24. *Fort Confidence, Peel's River.* Lefroy.
* " 24. *Lake Athabasca, Lewis and Pelly.* Lefroy.
* " 24. *Moose Factory, Martin's Falls.* Lefroy.
* " 24. *Hawarden, Engl.* Glaisher.
* " 25. *Fort Confidence.* Lefroy.
* " 25. *Peel's River, Lake Athabasca.* Lefroy.
* " 25. *Moose Factory, Montreal.* Lefroy.
* " 25. *Burlington, Vt. Ogdensburg, N. Y.* Smith. R.
* " 26. *Fort Confidence, Lake Athabasca.* Lefroy.
* " 26. *Hartford, Conn.* Smith. Records.
* " 27. *Fort Confidence.* Lefroy.
* " 27. *Lewis and Pelly, Moose Factory.* Lefroy.
* " 27. *Martin's Falls, Peel's River.* Lefroy.
* " 27. *Kenosha, Wisc.* Smith. Records.
* " 28. *Lake Athabasca, Peel's River.* Lefroy.
* " 28. *Lewis and Pelly, Moose Factory.* Lefroy.
* " 28. *Michipicoton, Martin's Falls.* Lefroy.
* " 28. *Yoncou, Toronto, London.* Lefroy.
* " 28. *Quebec, Newfoundland.* Lefroy.
* " 28. *Chautauque, Houseville, N. Y.* Smith. Rec.
* " 28. *Emerald Grove, Aztalan, Wisc* Smith. Rec.

*Feb. 28. *Greencastle, Indiana.* Smith. Records.
*March 1. *Fort Confidence, Lake Athabasca.* Lefroy.
* " 1. *Lewis and Pelly, Moose Factory.* Lefroy.
* " 1. *Martin's Falls, Albion Mines.* Lefroy.
" 2. *Fort Confidence, Peel's River.* Lefroy.
" 2. *Lewis and Pelly, Moose Factory.* Lefroy.
" 2. *Matawagomingen, Martin's Falls.* Lefroy.
" 2. *Michipicoton, Lake Athabasca.* Lefroy.
" 2. *Halifax, Kingston, Toronto.* Lefroy.
" 2. *Newfoundland, Albion Mines.* Lefroy.
" 3. *Lake Athabasca, Peel's River, Moose Fac.*
" 3. *Martin's Falls.* Lefroy.
" 3. *Alleghany Co., Penn.* Smith. Records.
" 4. *Lake Athabasca, Moose Factory.* Lefroy.
" 5. *Lake Athabasca.* Lefroy.
" 6. *Lake Athabasca.* Lefroy.
" 6. *Lewis and Pelly, Peel's River.* Lefroy.
" 6. *Lima, Penn.* Smith. Records.
" 7. *Fort Confidence, Moose Factory.* Lefroy.
" 7. *Martin's Falls, Quebec.* Lefroy.
" 7. *Kingston, Toronto, London.* Lefroy.
" 7. *Newfoundland.* Lefroy.
" 7. *Ogdensburg, N. Y.* Smith. Records.
" 7. *Stone, Hartwell Rectory, Engl.* Glaisher
" 8. *Moose Factory.* Lefroy.
" 8. *Stone, Engl.* Glaisher.
" 9. *Fort Confidence.* Lefroy.
" 9. *Peel's River, Moose Factory.* Lefroy.
" 9. *Martin's Falls, Halifax.* Lefroy.
" 10. *Montreal, London.* Lefroy.
" 10. *Newfoundland.* Lefroy.
" 10. *Alleghany Co., Penn.* Smith. Records.
" 10. *North Shields, Engl.* Glaisher.
" 11. *Fort Confidence, Lake Athabasca.* Lefroy.
" 11. *Lewis and Pelly, Moose Factory.* Lefroy.
" 11. *Michipicoton, Martin's Falls.* Lefroy.
" 11. *Newfoundland, Yoncou.* Lefroy.
" 12. *Lake Athabasca, Moose Factory.* Lefroy.
" 12. *At Sea, Barque Mason Barney, Lt.* 13° 46′.
" 12. Smithsonian Records. [*Long.* 53° 43′.
" 14. *Lake Athabasca, Montreal.* Lefroy.
" 14. *Kingston, Halifax.* Lefroy.
" 14. *Madrid, N. Y.* Smith. Records.
" 14. *Durham, Engl.* Glaisher.
" 15. *Lake Athabasca.* Lefroy.
" 15. *Newfoundland.* Lefroy.
" 16. *Halifax.* Lefroy.
" 18. *Lake Athabasca.* Lefroy.

March 18. *Hartwell, Engl.* Glaisher.
" 20. *Moose Factory.* Lefroy.
" 20. *Alleghany Co., Penn.* Smith. Records.
" 21. *Peel's River, Yoncou.* Lefroy.
" 21. *Martin's Falls, Moose Factory.* Lefroy.
" 21. *Lima, Penn.* Smith. Records.
* " 22. *Fort Confidence, Yoncou.* Lefroy.
* " 22. *Lake Athabasca, Peel's River.* Lefroy.
* " 22. *Martin's Falls, Moose Factory.* Lefroy.
* " 22. *Michipicoton, Toronto.* Lefroy.
* " 22. *Matawagomingen, Quebec.* Lefroy.
* " 22. *Montreal, Kingston.* Lefroy.
* " 22. *North Attleboro', Mass.* Smith. Records.
* " 22. *Lima, Penn.* Smith. Records.
" 23. *Peel's River, Lewis and Pelly.* Lefroy.
" 23. *Halifax?* Lefroy.
" 23. *Lima? Penn.* Smith. Records.
" 24. *Fort Confidence, Moose Factory.* Lefroy.
" 24. *Martin's Falls, Lewis and Pelly.* Lefroy.
" 24. *Alleghany, Penn.* Smith. Records.
" 24. *Beloit, Wisc.* Smith. Records.
* " 25. *Fort Confidence, Martin's Falls.* Lefroy.
* " 25. *Lake Athabasca, Halifax.* Lefroy.
* " 25. *Beloit, Wisc.* Smith. Records.
* " 26. *Lake Athabasca.* Lefroy.
" 27. *Peel's River, Lewis and Pelly.* Lefroy.
" 27. *Martin's Falls, Moose Factory.* Lefroy.
" 27. *Michipicoton.* Lefroy.
* " 28. *Fort Confidence.* Lefroy.
* " 28. *Lewis and Pelly, Moose Factory.* Lefroy.
* " 28. *Lake Athabasca, Peel's River.* Lefroy.
* " 28. *Michipicoton, Toronto.* Lefroy.
* " 29. *Fort Confidence, Yoncou.* Lefroy.
* " 29. *Lake Athabasca, Peel's River.* Lefroy.
* " 29. *Lewis and Pelly, Martin's Falls.* Lefroy.
* " 29. *Toronto, Albion Mines.* Lefroy.
* " 29. *Newfoundland, Halifax.* Lefroy.
* " 29. *Alleghany Co., Penn.* Smith. Records.
" 30. *Lake Athabasca.* Lefroy.
" 30. *Peel's River, Martin's Falls.* Lefroy.
" 30. *Alleghany, Lima, Penn.* Smith. Records.
* " 31. *Fort Confidence, Lewis and Pelly.* Lefroy.
* " 31. *Moose Factory, Martin's Falls.* Lefroy.
* " 31. *Kingston, Lake Athabasca.* Lefroy.
* " 31. *Michipicoton, Montreal.* Lefroy.
* " 31. *Toronto, London.* Lefroy.
*April 1. *Fort Confidence, Fort Chipewyan.* Lefroy.
* " 1. *Lewis and Pelly, Moose Factory.* Lefroy.

April 2. *Fort Chipewyan.* Lefroy.
* " 3. *Fort Chipewyan.* Lefroy.
* " 3. *Peel's River, Moose Factory.* Lefroy.
* " 3. *Michipicoton, Toronto.* Lefroy.
* " 3. *Alleghany Co., Lima, Penn.* Smith. Records.
" 4. *Moose Factory.* Lefroy.
* " 5. *Fort Chipewyan, Yoncou.* Lefroy.
* " 5. *Moose Factory, Lewis and Pelly.* Lefroy.
* " 5. *Michipicoton.* Lefroy.
* " 6. *Yoncou, Moose Factory.* Lefroy.
* " 6. *Michipicoton, Montreal.* Lefroy.
" 7. *Fort Confidence.* Lefroy
" 7. *Fort Chipewyan, Quebec.* Lefroy.
" 7. *Burlington, Vt.* Smith. Records.
" 7. *Leeds, Engl.* Glaisher.
" 8. *Fort Chipewyan.* Lefroy.
" 8. *Alleghany Co., Penn.* Lefroy.
" 9. *Fort Confidence.* Lefroy.
" 9. *Fort Chipewyan, Moose Factory.* Lefroy.
" 10. *Fort Chipewyan, Moose Factory.* Lefroy.
" 10. *Alleghany Co., Penn.* Smith. Records.
" 11. *Fort Confidence, Moose Factory.* Lefroy.
" 11. *Michipicoton.* Lefroy.
" 12. *Yoncou.* Lefroy.
" 13. *Fort Chipewyan.* Lefroy.
" 14. *Moose Factory.* Lefroy.
" 16. *Fort Chipewyan, Moose Factory.* Lefroy.
" 16. *Michipicoton.* Lefroy.
* " 17. *Yoncou, Moose Factory, Quebec.* Lefroy.
" 18. *Fort Chipewyan.* Lefroy.
" 18. *Nottingham, Engl.* Glaisher.
* " 19. *Fort Chipewyan.* Lefroy.
" 20. *Fort Chipewyan.* Lefroy.
" 20. *Moose Factory, Michipicoton.* Lefroy.
" 21. *Moose Factory.* Lefroy.
" 21. *Hawarden, Grantham, Engl.* Glaisher.
* " 22. *Fort Chipewyan.* Lefroy.
* " 22. *Moose Factory, Michipicoton.* Lefroy.
* " 22. *Quebec, Halifax.* Lefroy.
" 23. *Fort Chipewyan, Moose Factory.* Lefroy.
" 23. *Michipicoton.* Lefroy.
" 23. *Albion Mines, Halifax.* Lefroy.
" 24. *Yoncou.* Lefroy.
" 24. *Lima, Penn.* Smith. Records.
" 25. *Moose Factory, Halifax.* Lefroy.
" 26. *Halifax.* Lefroy.
" 27. *Fort Chipewyan, Moose Factory.* Lefroy.
" 27. *Halifax, Albion Mines.* Lefroy.

April 27. *Dubuque, Iowa.* Smith. Records.
" 28. *Fort Chipewyan.* Lefroy.
" 28. *Yoncou, Moose Factory.* Lefroy.
" 28. *Michipicoton, Halifax.* Lefroy.
" 29. *Fort Chipewyan.* Lefroy.
" 29. *Moose Factory, Halifax.* Lefroy.
* " 30. *Fort Chipewyan, Moose Factory.* Lefroy.
*May 1. *Moose Factory, Quebec.* Lefroy.
* " 1. *Michipicoton, St. Johns.* Lefroy.
* " 1. *Hartford, Conn., Lima, Penn.* Smith. Rec.
* " 1. *Balt. and Ohio Railroad, Md.* Smith. Rec.
* " 1. *Battle Creek, Mich., Beloit, Wisc.* Smith. Rec.
* " 2. *Moose Factory.* Lefroy.
" 3. *Moose Factory, St. Johns.* Lefroy.
" 3. *Michipicoton.* Lefroy.
* " 4. *Hartford, Conn.* Smith. Records.
" 5. *Moose Factory.* Lefroy.
" 5. *Hartford, Conn.* Smith. Records.
" 6. *Moose Factory.* Lefroy.
" 7. *Moose Factory, Michipicoton.* Lefroy.
" 7. *Kingston, Toronto.* Lefroy.
" 10. *Moose Factory.* Lefroy.
" 11. *St. Johns.* Lefroy.
* " 12. *St. Johns.* Lefroy.
" 14. *Moose Factory.* Lefroy.
" 15. *Whitehaven, Engl.* Lefroy.
* " 16. *St. Johns.* Lefroy.
" 17. *Moose Factory, St. Johns.* Lefroy.
" 17. *Hartford, Conn.* Smith. Records.
" 18. *Moose Factory, Michipicoton.* Lefroy.
" 19. *Moose Factory.* Lefroy.
* " 20. *Moose Factory.* Lefroy.
" 21. *Somerville, N. Y., Keene, Ohio.* Smith. Rec.
* " 23. *Moose Factory.* Lefroy.
* " 24. *Moose Factory?* Lefroy.
* " 26. *Moose Factory.* Lefroy.
* " 26. *Mouth of St. Lawrence.* Lefroy.
" 28. *Moose Factory.* Lefroy.
* " 30. *Moose Factory, Michipicoton.* Lefroy.
" 31. *Moose Factory.* Lefroy.
June 1. *Moose Factory?* Lefroy.
" 3. *Dalhousie, C. E.* Lefroy.
" 4. *London, C. W.* Lefroy.
* " 5. *Moose Factory, Quebec.* Lefroy.
* " 5. *Michipicoton, Dalhousie.* Lefroy.
* " 5. *Montreal, Toronto.* Lefroy.
* " 5. *St. Johns, Mouth of St. Lawrence.* Lefroy.
* " 5. *Londonderry, N. H.* Smith. Rec.

*June 5. *Middlebury, Vt., Ogdensburg, N. Y.* Smith. R.
* " 5. *Springfield, Mass., New Haven, Conn.* S. R.
" 6. *At Sea, Ship Yorktown, Lat.* 39° 53′ *N.*
" 6. Smithsonian Records. [*Long.* 59° *W.*
" 13. *Moose Factory, Toronto.* Lefroy.
" 14. *Moose Factory.* Lefroy.
" 15. *Moose Factory.* Lefroy.
" 16. *Moose Factory.* Lefroy.
" 19. *Nottingham, Engl.* Glaisher.
" 20. *Moose Factory.* Lefroy.
" 20. *Dalhousie, London.* Lefroy.
" 20. *Ogdensburg, N. Y.* Smith. Records.
" 20. *Nottingham, Engl.* Glaisher.
" 21. *Moose Factory.* Lefroy.
" 22. *Moose Factory.* Lefroy.
" 23. *Freeport, Penn.* Lefroy.
" 24. *Moose Factory.* Lefroy.
" 24. *Ceres, Penn.* Lefroy.
" 26. *Michipicoton, Toronto.* Lefroy.
" 26. *Mouth of St. Lawrence.* Lefroy.
* " 27. *Moose Factory, Montreal.* Lefroy.
* " 27. *Concord, N. H.* Smith. Records.
* " 27. *Ceres, Penn.* Smith. Records.
" 30. *Moose Factory.* Lefroy.
*July 2. *Moose Factory, Quebec.* Lefroy.
" 3. *Moose Factory, London.* Lefroy.
" 3. *Albion Mines, St. Johns.* Lefroy.
" 4. *New Harmony, Indiana.* Smith. Records.
" 10. *Michipicoton.* Lefroy.
" 11. *Moose Factory.* Lefroy.
" 12. *Moose Factory.* Lefroy.
* " 13. *Moose Factory.* Lefroy.
" 14. *Quebec? Toronto?* Lefroy.
" 15. *Moose Factory.* Lefroy.
* " 17. *Albion Mines, Toronto.* Lefroy.
* " 17. *Michipicoton, Kingston.* Lefroy.
* " 17. *Londonderry, N. H.* Lefroy.
* " 17. *Bloomfield, N. J.* Lefroy.
" 18. *Moose Factory, Toronto.* Lefroy.
" 20. *Moose Factory, Michipicoton.* Lefroy.
" 23. *Moose Factory.* Lefroy.
" 23. *Quebec, Montreal.* Lefroy.
" 24. *Moose Factory.* Lefroy.
" 25. *Moose Factory, Michipicoton.* Lefroy.
* " 26. *Michipicoton.* Lefroy.
* " 26. *Kingston, Toronto.* Lefroy.
* " 26. *Old Town, Maine.* Lefroy.
" 27. *Moose Factory.* Lefroy.

July 28. *Moose Factory.* Lefroy.
" 28. *New York.* Smith. Records.
* " 29. *Moose Factory.* Lefroy.
" 30. *Moose Factory.* Lefroy.
" 31. *Moose Factory.* Lefroy.
" 31. *New York.* Lefroy.
August 1. *Moose Factory.* Lefroy.
" 2. *Moose Factory.* Lefroy.
" 3. *Moose Factory, St. Johns.* Lefroy.
" 4. *Moose Factory?* Lefroy.
" 5. *Moose Factory, Toronto.* Lefroy.
" 7. *Moose Factory, Montreal?* Lefroy.
" 13. *Stone, Engl.* Glaisher.
" 14. *Stone, Engl.* Glaisher.
" 17. *Matawagomingen.* Lefroy.
" 18. *Moose Factory.* Lefroy.
" 20. *Moose Factory, Toronto.* Lefroy.
" 20. *Matawagomingen.* Lefroy.
" 21. *Moose Factory.* Lefroy.
" 21. *Abreast of Sambro Light, N. S.* Lefroy.
" 21. *Nottingham, Engl.* Glaisher.
" 23. *Albion Mines.* Lefroy.
* " 24. *Fort Simpson, Toronto.* Lefroy.
* " 24. *Moose Factory, London.* Lefroy.
* " 24. *Battle Creek, Mich.* Smith. Records.
* " 24. *Hawarden, North Shields.* Glaisher.
* " 25. *Moose Factory?* Lefroy.
* " 25. *At Sea, Lat.* 49° 44′ *N? Long.* 41° 6′ *W.*
* " 26. *Moose Factory, Kingston.* Lefroy.
* " 26. *Matawagomingen.* Lefroy.
* " 26. *Toronto, London.* Lefroy.
" 27. *Moose Factory.* Lefroy.
" 28. *Down the Mackenzie River.* Lefroy.
* " 29. *Lewis and Pelly, Montreal.* Lefroy.
* " 29. *Kingston, Toronto.* Lefroy.
* " 29. *Albion Mines, St. Johns.* Lefroy.
* " 29. *Sugar Grove, Penn.* Lefroy.
* " 29. *Battle Creek, Mich., Emerald Grove, Wisc.*
* " 29. *At Sea, Lat.* 51° 25′ *N? Long.* 10° 30′ *W.*
* " 30. *Moose Factory.* Lefroy.
* " 30. *Albion Mines, Toronto.* Lefroy. [Rec.
* " 30. *Londonderry, N.H., Madrid, N.Y.* Smith.
* " 30. *Battle Creek, Mich., Emerald Grove, Wisc.*
* " 30. *At Sea, Ship Wisconsin, Lt.* 48°. *Lg.* 37°.
* " 30. *At Sea, Ship Roscius, Lt.* 48° 59′. *Lg.* 35°.
* " 30. *At Sea, Ship J. E. Donnell, Lat.* 39° 52′.
* " 30. Smithsonian Institution. [*Lg.* 69° 8′ *W.*
* " 30. *Stonyhurst, Whitehaven, Engl.* Glaisher.

*August 31. *Moose Factory.* Lefroy.
* " 31. *Toronto, St. Johns.* Lefroy.
* " 31. *At Sea, Ship Wisconsin, Lat.* 48° 59′.
* " 31. Smithsonian Records. [*Lg.* 40° 8′ *W.*
*Sept. 1. *Moose Factory?* Lefroy.
" 2. *Moose Factory, Matawagomingen.* Lefroy.
* " 3. *Lewis and Pelly, Dalhousie.* Lefroy.
* " 3. *Montreal, Albion Mines.* Lefroy.
* " 3. *Whitehead, Maine.* Smith. Records.
* " 3. *Ogdensburg, Rochester, N.Y.* Smith. Rec.
* " 3. *Madrid, Seneca Falls, N.Y.* Smith. Rec.
* " 3. *Madison C.H., Va., Augusta, Ill.* Smith. R.
* " 3. *Milwaukie, Wisc., Detroit, Mich.* Smith. R.
* " 3. *At Sea, Ship Wisconsin, Lat.* 45° 35′.
* " 3. Smithsonian Records. [*Lg.* 43° 25.
* " 4. *Near Peel's River, Moose Factory.* Lefroy.
* " 4. *St. Johns.* Lefroy. *Steuben, Me.* Smith. R.
* " 4. *New York, Baldwinsville, N.Y.* Smith. R.
* " 4. *Kew, Engl.* Glaisher. [Rec.
" 5. *Dalhousie.* Lefroy. *Dublin, N.H.* Smith.
* " 6. *Moose Factory, Quebec.* Lefroy.
* " 6. *Montreal, Albion Mines.* Lefroy.
* " 6. *Kingston, Toronto, London.* Lefroy.
* " 6. *Oldtown, Me., Burlington, Vt.* Smith. Rec.
* " 6. *Concord, Dublin, White Mts., N.H.*[1] S. R.
* " 6. *Attleboro, Mass., Detroit, Mich.* Smith. R.
* " 6. *Augusta, Hancock, Ill., Richmond, Ind.* S.R.
* " 6. *Durham, Whitehaven, Engl.* Glaisher.
" 7. *Moose Factory, Quebec, Dalhousie.* Lefroy.
" 7. *Montreal, Albion Mines, St. Johns.* Lefroy.
" 7. *Kingston, Toronto, London.* Lefroy.
" 7. *Dublin, N. H. Burlington, Vt.* Lefroy.
" 7. *North Attleboro, Mass., Augusta, Ill.* S.R.
" 7. *At Sea, Ship T. E. Donnell, Lt.* 37°. *Lg.* 60°.
" 7. *At Sea, Ship Henry Clay, Lat.* 40° 43′.
" 7. Smithsonian Records. [*Lg.* 59° 56′.
" 7. *Whitehaven, Engl.* Glaisher.
" 8. *Moose Factory.* Lefroy.
" 8. *Quebec, Dalhousie.* Lefroy.
" 8. *Madrid, N. Y., Detroit, Mich.* Smith. R.
" 8. *At Sea, Ship Wisconsin, Lat.* 44° 55′.
" 9. *Lewis and Pelly.* Lefroy. [*Lg.* 53° 28′.
* " 10. *Between Peel and Rat? Rivers.* Lefroy.
* " 10. *Moose Factory, Albany, H. B. T.* Lefroy.
" 11. *Lewis and Pelly?* Lefroy.
* " 14. *Albany, H. B. T., Moose Factory.* Lefroy.
* " 14. *Hartwell Rectory, Whitehaven.* Glaisher.

[1] Boston Evening Transcript.

*Sept. 15. *Lewis and Pelly, Moose Factory.* Lefroy.
* " 15. *Quebec, Kingston, Toronto.* Lefroy.
* " 15. *Stone, Hartwell Rectory, Nottingham,*
* " 15. *Gainsborough, Stonyhurst, Whitehaven,*
* " 15. *Harpham, Yorkshire, Durham.* Glaisher.
* " 16. *Lewis and Pelly, Albany, H. B. T.* Lefroy.
* " 16. *Moose Factory, Montreal.* Lefroy.
* " 16. *Kingston, Toronto, St. Johns.* Lefroy.
* " 16. *North Attleboro, Mass.* Smith. Records.
" 17. *Albany, H. B. T., Moose Factory.* Lefroy.
" 18. *Montreal.* Lefroy.
" 20. *Lewis and Pelly, Albany, H. B. T.* Lefroy.
" 20. *Moose Factory, Kingston.* Lefroy.
" 21. *Moose Factory.* Lefroy.
" 22. *Lewis and Pelly, Albany, H. B. T.* Lefroy.
" 22. *Moose Factory, Dalhousie.* Lefroy.
" 23. *Albany? H.B.T. Moose Factory?* Lefroy.
" 23. *Ogdensburg? N. Y.* Smith. Records.
* " 24. *Lewis and Pelly.* Lefroy.
* " 26. *Pelly River.* Lefroy.
* " 27. *Pelly River, Moose Factory.* Lefroy.
* " 27. *Matawagomingen, St. Johns.* Lefroy.
* " 27. *Hawarden, Durham, Engl.* Lefroy.
* " 28. *Pelly River, Quebec.* Lefroy.
* " 28. *Matawagomingen.* Lefroy.
* " 28. *Washington, D. C.* Fairbanks. [sher.
* " 28. *Norwich, Harpham, Durham, Engl.* Glai-
* " 29. *Pelly River, Albany, H. B. T.* Lefroy.
* " 29. *Quebec, Toronto, St. Johns.* Lefroy.
* " 29. *Dublin, N. H., Burlington, Vt.* Smith. Rec.
* " 29. *Middletown, Conn., Rochester, N. Y.* S. R.
* " 29. *Madrid, Ogdensburg, N. Y.* Smith. Rec.
* " 29. *Bloomfield, Burlington, N. J.* Smith. Rec.
* " 29. *Morrisville, Morristown, Lima, Pa.* S. R.
* " 29. *Sugar Grove, Gettysburg, Pa.* Smith. Rec.
* " 29. *Sykesville, Frederick, Md.* Smith. Rec.
* " 29. *Washington, D. C.* Smith. Records.
* " 29. *Madison, Winchester, Diamond Grove, Va.,*
* " 29. *Chapel Hill, N. C. Charleston, S. C.* Smith. R.
* " 29. *Hillsboro, Republic, Ohio.* Smith. Records.
* " 29. *Bowling Green, Ky. Clarkesville, Te.,*
* " 29. *Lake Scuppernang, Lebanon, Te.* Smith. R.
* " 29. *Howell, Battle Creek, Mich.* Smith. Rec.
* " 29. *Keucosha, Milwaukie, Wisc.* Smith. Rec.
* " 29. *Plattesville, Beloit, Wisc.* Smith. Records.
* " 29. *Dubuque, Muscatine, Iowa.* Smith. Records.
* " 29. *Petersburg, Augusta, Ill.* Smith. Records.
* " 29. *Erie, Eutau, Alabama, Richmond, Ind.,*

*Sept. 29. *At Sea, Ship H. Clay, Lt.* 46°. *Lg.* 42°.
* " 29. *At Sea, Ship Alarm, Lt.* 29°43'. *Lg.* 64° 16'.
* " 29. *At Sea, Ship J. E. Donnel, Lat.* 38° 24'.
* " 29. Smithsonian Records. [*Lg.* 32° 30.
* " 29. *Wakefield, Durham, North Shields,*
* " 29. *Hartwell House, Nottingham.* Glaisher.
* " 29. *Maidenstone Hill, Stone.* Glaisher.
* " 29. *Hartwell Rectory, Cardington.* Glaisher.
* " 30. *Albany, Dalhousie, Toronto.* Lefroy.
* " 30. *Moose Factory.* Lefroy. *Sag Harbor, N. Y.,*
* " 30. *At Sea, Ship Sturgis, Lat.* 29°. *Lg.* 73°.
* " 30. *Nottingham, Yorkshire? Engl.* Glaisher.
*Oct. 1. *Lewis and Pelly, Toronto.* Lefroy.
* " 2. *Dalhousie, Albion Mines.* Lefroy.
* " 2. *Toronto, St. Johns.* Lefroy.
* " 2. *Dublin, N.H., Dubuque, Iowa.* Smith. Rec.
* " 2. *Maidenstone Hill, Oxford, Cardington,*
* " 2. *Norwich, Nottingham, Stonyhurst,*
* " 2. *Whitehaven, Durham.* Glaisher.
* " 2. *North Shields, Dunino.* Glaisher.
* " 2. *Yorkshire, Engl.* Glaisher.
* " 3. *Moose Factory, Toronto?* Lefroy.
* " 3. *Cardington, Nottingham.* Glaisher.
* " 4. *Albany, H. B. T.* Lefroy.
* " 4. *Moose Factory, Toronto.* Lefroy.
* " 4. *Nottingham, Durham.* Glaisher.
" 5. *Albany, H. B. T., Moose Factory.* Lefroy.
" 6. *Albany, H. B. T.* Lefroy.
" 8. *Fort Simpson, Moose Factory.* Lefroy.
" 9. *Fort Simpson? Lewis and Pelly.* Lefroy.
" 10. *Fort Simpson.* Lefroy.
" 11. *Fort Simpson.* Lefroy.
" 12. *Fort Simpson.* Lefroy.
" 13. *Fort Simpson.* Lefroy.
" 14. *Stonyhurst, Engl.* Glaisher.
" 15. *Fort Simpson, Moose Factory.* Lefroy.
" 15. *Stonyhurst, Engl.* Glaisher.
" 17. *Lewis and Pelly? Albany, H.B.T.* Lefroy.
" 17. *Moose Factory, Quebec.* Lefroy.
* " 18. *Fort Simpson, Dalhousie.* Lefroy. [Rec.
* " 18. *Old Town, Maine, Burlington, Vt.* Smith.
* " 18. *Toronto, Bond Lake.* Lefroy.
* " 18. *St. Johns, Lake Champlain.* Lefroy.
* " 18. *Durham, Engl.* Glaisher. [Smith. Rec.
* " 19. *Fort Simpson.* Lefroy. *Bucksport, Me.*
* " 20. *Fort Simpson, Albany, H. B. T.* Lefroy.
* " 20. *Dalhousie, Montreal.* Lefroy.
* " 20. *Albion Mines, St. Johns.* Lefroy.

*Oct. 20. *Quebec, Kingston, London.* Lefroy.
* " 20. *Steuben, Me., Manchester, N.H.* Smith. Rec.
* " 20. *Dublin, Londonderry, N. H.* Smith. Rec.
* " 20. *Burlington, Middlebury, Vt.* Smith. Rec.
* " 20. *Somerville, Ogdensburg, N. Y.* Smith. Rec.
* " 20. *Middletown, Conn., Burlington, N. J.* S. R.
* " 20. *Washington, D. C., Milwaukie, Wisc.* S. R.
* " 21. *Albany, H. B. T., Toronto.* Lefroy.
* " 21. *Moose Factory.* Lefroy.
* " 22. *Lewis and Pelly, Moose Factory.* Lefroy.
* " 22. *Montreal, Kingston.* Lefroy.
* " 22. *Toronto, St. Johns.* Lefroy.
* " 23. *Fort Simpson, Quebec.* Lefroy.
* " 23. *Albany, H. B. T., Dalhousie.* Lefroy.
* " 23. *Burlington, Vt., Manchester, N.H.* Smith. Rec.
* " 23. *Londonderry, N. H.* Smith. Rec.
* " 24. *Fort Simpson, Moose Factory, Quebec.* Lefroy.
" 25. *Fort Simpson, Albany, H. B. T.* Lefroy.
* " 26. *Fort Simpson, Lewis and Pelly.* Lefroy.
* " 26. *Moose Factory, Toronto.* Lefroy.
* " 26. *Albany, H. B. T.* Lefroy.
" 27. *Moose Factory.* Lefroy.
* " 28. *Moose Factory, Quebec.* Lefroy.
* " 28. *Albion Mines, St. Johns.* Lefroy.
* " 28. *Dalhousie.* Lefroy. *At Sea.* Smith. Rec.
* " 28. *Wakefield, Stonyhurst. Durham.* Glaisher.
* " 28. *Whitehaven, North Shields.* Glaisher.
* " 29. *St. Johns.* Lefroy. *Hartwell Rectory.* Glaisher.
* " 29. *Nottingham, Wakefield, Dunino.* Glaisher.
Nov. 2. *Lewis and Pelly?* Lefroy.
" 3. *Fort Simpson, Toronto?* Lefroy.
" 4. *Aylesbury, Nottingham.* Glaisher.
" 5. *Peel's River.* Lefroy.
" 5. *Stonyhurst.* Glaisher.
" 6. *Lewis and Pelly.* Lefroy.
" 6. *Stonyhurst?* Glaisher.
" 8. *Lewis and Pelly.* Lefroy.
" 9. *Lewis and Pelly?* Lefroy.
" 9. *Albany, H. B. T., Moose Factory.* Lefroy.
" 10. *Albany, H. B. T.* Lefroy.
* " 11. *Peel's River, Albany, H. B. T.* Lefroy.
" 12. *Toronto?* Lefroy.
" 13. *Fort Simpson, Peel's River.* Lefroy.
" 13. *Stonyhurst, Engl.* Glaisher.
" 14. *Pelly River, Fort Simpson.* Lefroy.
" 14. *Peel's River, St. Johns.* Lefroy.
* " 15. *Fort Simpson, Peel's River.* Lefroy.
* " 15. *Toronto, St. Johns.* Lefroy.

*Nov. 15. *At Sea, Ship Roscius, Lt.* 51° 57′ *N. Lg.* 26° [35′ *W.*
* " 15. Smithsonian Records.
" 16. *Fort Simpson, Moose Factory.* Lefroy.
" 16. *Lewis and Pelly?* Lefroy. [10′ *W.*
" 16. *At Sea, Ship Roscius, Lt.* 50°37′ *N. Lg.* 25°
* " 17. *Moose Factory? Toronto.* Lefroy.
* " 17. *At Sea, Ship Roscius, Lt.* 50°. *Lg.* 22°54′ *W.*
" 18. *Toronto.* Lefroy.
" 19. *Peel's River, Moose Factory.* Lefroy.
* " 20. *Fort Simpson?* Lefroy.
* " 20. *Aylesbury, Engl.* Glaisher.
* " 21. *Fort Simpson,*[1] *Lewis and Pelly.*[1] Lefroy.
* " 21. *Aylesbury, Engl.* Glaisher.
* " 22. *Pelly River, Fort Simpson.*[1] Lefroy.
" 23. *Fort Simpson, Peel's River.* Lefroy.
" 23. *Toronto.* Lefroy.
" 24. *Peel's River, Moose Factory.* Lefroy.
" 24. *Toronto.* Lefroy.
" 24. *Dunino, Engl.* Glaisher.
" 25. *Fort Simpson, Peel's River.* Lefroy.
" 26. *Fort Simpson.* Lefroy.
" 26. *Stonyhurst, Engl.* Glaisher.
" 27. *Fort Simpson.* Lefroy.
" 28. *Peel's River.* Lefroy.
" 29. *Peel's River, Lewis and Pelly.* Lefroy.
" 29. *Albany, H. B. T.* Lefroy.
" 29. *Moose Factory, Toronto.* Lefroy.
* " 30. *Peel's River, Toronto.* Lefroy.
Dec. 1. *Fort Simpson, Peel's River.* Lefroy.
" 1. *Lewis and Pelly.* Lefroy.
" 1. *Albany, H. B. T., Toronto.* Lefroy.
" 2. *Peel's River.* Lefroy.
" 3. *Peel's River.* Lefroy.
" 4. *Fort Simpson, Toronto?* Lefroy.
* " 5. *Fort Simpson.* Lefroy.
* " 6. *Toronto.* Lefroy. [2′.
* " 6. *At Sea, Ship Yorktown, Lt.* 50°13′. *Lg.* 33°
* " 6. Smithsonian Records.
* " 6. *Hawarden, Liverpool, North Shields,*
* " 6. *Wakefield, Durham.* Glaisher.
" 7. *Peel's River, Lewis and Pelly?* Lefroy.
" 8. *St. Johns.* Lefroy.
" 8. *Hawarden, Engl.* Glaisher.
" 9. *Peel's River.* Lefroy.
" 10. *Fort Simpson, Peel's River.* Lefroy.
" 11. *Albany, H. B. T., Moose Factory.* Lefroy.
" 12. *Pelly River, Lewis and Pelly.* Lefroy.

[1] Aurora Australis.

Dec. 12. *Albany, H. B. T., Toronto.* Lefroy.
" 13. *Lewis and Pelly, Albany, H. B. T.* Lefroy.
" 13. *Moose Factory, Toronto.* Lefroy.
" 14. *Pelly River, Fort Simpson.* Lefroy.
" 14. *Albany, H. B. T.* Lefroy.
" 14. *Peel's River, Moose Factory.* Lefroy.
" 15. *Pelly River, Fort Simpson.* Lefroy.
" 15. *Peel's River.* Lefroy.
" 16. *Pelly River, Fort Simpson.* Lefroy.
" 16. *Peel's River.* Lefroy.
" 17. *Pelly River, Fort Simpson.* Lefroy.
" 17. *Peel's River, Lewis and Pelly.* Lefroy.
* " 18. *Peel's River, Albany, H. B. T.* Lefroy.
* " 18. *Moose Factory, Toronto.* Lefroy.
* " 18. *AtSea,ShipRoscius, Lt.* 55° 56′. *Lg.* 11° 57′.
* " 18. Smithsonian Records.
" 19. *Pelly River, Fort Simpson.* Lefroy.
" 19. *Peel's River, Lewis and Pelly.* Lefroy.
" 20. *Pelly River, Fort Simpson.* Lefroy.
" 20. *Lewis and Pelly, Albany, H. B. T.* Lefroy.
" 20. *Peel's River, Moose Factory.* Lefroy.
" 20. *At Sea, Ship Roscius, Lt.* 56° 56′*N. Lg.*18°.
* " 21. *Pelly River,Fort Simpson.* Lefroy. [40′*W.*
* " 21. *Lewis and Pelly, Albany, H. B. T.* Lefroy.
* " 21. *Peel's River, Moose Factory.* Lefroy. [40*W.*
* " 21. *Quebec,Montreal,Toronto.St. Johns.* Lefroy.
" 22. *Pelly River, Lewis and Pelly.* Lefroy.
" 22. *Albany, H. B. T., Peel's River.* Lefroy.
" 22. *Moose Factory,Dalhousie,St.Johns.* Lefroy.
" 22. *At Sea, Ship New World, Lt.* 50° 48′. *Lg.*
" 22. Smithsonian Records. [27° 16′*W.*
" 22. *Stonyhurst, Whitehaven.* Glaisher.
" 22. *Nottingham, Hawarden.* Glaisher.
" 22. *Durham, North Shields, Dunino.* Glaisher.
* " 23. *Pelly River, Fort Simpson.* Lefroy.
* " 23. *Albany, H.B.T., Lewis and Pelly?* Lefroy.
* " 23. *Peel's River, Moose Factory.* Lefroy.
* " 23. *Dalhousie,Toronto,London.* Lefr. [28½° *W.*
* " 23. *At Sea, Ship New World, Lt.* 51° 28′. *Lg.*
* " 23. *At Sea, Ship Roscius, Lt.* 55° 37′*N. Lg.*23°.
* " 23. Smithsonian Records. [*W.*
* " 23. *Whitehaven, Dunino.* Glaisher.
" 24. *Pelly River, Fort Simpson.* Lefroy.
" 24. *Lewis and Pelly, Albany, H. B. T.* Lefroy.
" 24. *Peel's River, Moose Factory.* Lefroy.
* " 25. *Pelly River, Fort Simpson?* Lefroy.
* " 25. *Dalhousie, Lewis and Pelly.* Lefroy.
* " 25. *Toronto, London, St. John.* Lefroy.

*Dec. 26. *Pelly River, Fort Simpson, Peel's River,*
* " 26. *Albany, H.B.T., Moose Factory.* Lefroy.
* " 27. *Pelly River, Fort Simpson.* Lefroy.
* " 27. *Lewis and Pelly.* Lefroy.
* " 27. *Peel's River, Dalhousie.* Lefroy.
* " 28. *Pelly River, Toronto.* Lefroy.
* " 28. *Grantham, Dunino.* Glaisher.
* " 29. *Fort Simpson, Peel's River.* Lefroy.
* " 29. *Montreal, Kingston.* Lefroy.
* " 29. *Toronto, St. Johns.* Lefroy. [58°*E.*
* " 29. *At Sea, Ship Plymouth, Lat.* 36° 51′*S. Lg.*
* " 29. Smithsonian Records.
* " 29. *North Shields, Dunino.* Glaisher.
* " 29. *Grantham, Stonyhurst.* Glaisher.
* " 30. *Fort Simpson, Peel's River.* Lefroy.
* " 31. *At Sea, ShipPlymouth, Lt.*37°*S. Lg.* 61°*E.*[1]
* " 31. Smithsonian Records.

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Jan. 1. *Peel's River.* Lefroy.
" 2. *Lewis and Pelly.* Lefroy.
* " 3. *Fort Simpson.* Lefroy.
" 4. *North Shields, Dunino.* Glaisher.
" 6. *Albany, H. B. T., Moose Factory.* Lefroy.
" 7. *Peel's River.* Lefroy.
" 8. *Peel's River, Lewis and Pelly.* Lefroy.
" 11. *Fort Simpson, Peel's River.* Lefroy.
" 12. *Moose Factory.* Lefroy.
" 13. *Albany, H. B. T., Moose Factory.* Lefroy.
" 14. *Peel's River, Albany, H. B. T.* Lefroy.
" 14. *Moose Factory.* Lefroy.
" 15. *Fort Simpson, Peel's River.* Lefroy.
" 15. *Moose Factory.* Lefroy.
" 16. *Fort Simpson, Peel's River.* Lefroy.
" 16. *Moose Factory.* Lefroy.
* " 17. *Albany, H. B. T., Moose Factory.* Lefroy.
* " 17. *Durham, Engl.* Glaisher.
" 18. *Moose Factory? St. Johns.* Lefroy.
* " 19. *Albany, H. B. T., Moose Factory.* Lefroy.
* " 19. *Quebec, Montreal, Kingston.* Lefroy.
* " 19. *Toronto, London, Halifax.* Lefroy.
* " 20. *Fort Simpson? Lewis and Pelly.* Lefroy.
* " 20. *Moose Factory? Albany, H. B. T.* Lefroy.
* " 20. *Halifax, St. Johns.* Lefroy. [*Lg.* 9°*W.*
* " 20. *At Sea, Ship Hendrick Hudson, Lat.* 49°*N.*
* " 20. Smithsonian Records.
* " 20. *Falmouth, Engl.* Glaisher.

[1] Aurora Australis.

*Jan. 21. *Peel's River, Albany, H. B. T.* Lefroy.
* " 21. *Moose Factory, Toronto.* Lefroy.
* " 21. *Aylesbury, Durham, Engl.* Glaisher.
* " 22. *Albany, H. B. T., Moose Factory.* Lefroy.
* " 22. *Halifax.* Lefroy. *Hartwell Rectory.* Glaisher.
* " 23. *Peel's River, Albany, Moose Factory.* Lefroy.
* " 23. *Hatton, Oxford, Hartwell Rectory,*
* " 23. *Cardington, Grantham, Gainsborough,*
* " 23. *Hawarden, Durham, Dunino.* Glaisher.
" 24. *Fort Simpson, Peel's River.* Lefroy.
" 24. *Moose Factory, Albany, H. B. T.* Lefroy.
" 24. *Kingston, Toronto.* Lefroy.
* " 25. *Fort Simpson, Lewis and Pelly.* Lefroy.
* " 25. *Moose Factory, Albany, H. B. T.* Lefroy.
* " 25. *St. Johns, Halifax.* Lefroy.
* " 25. *Durham, Dunino, Hawarden.* Glaisher.
* " 25. *Manchester, Stonyhurst.* Glaisher.
* " 26. *Fort Simpson, Peel's River.* Lefroy.
* " 26. *Moose Factory, Albany, H. B. T.* Lefroy.
* " 26. *Montreal, Toronto.* Lefroy.
" 28. *Albany, H. B. T., Moose Factory.* Lefroy.
" 29. *Albany, H. B. T., Moose Factory.* Lefroy.
" 30. *Peel's River, Albany, Moose Factory.* Lefroy.
" 30. *Rose Hill, Thame, North Shields.* Glaisher.
" 31. *Fort Simpson, Albany, H. B. T.* Lefroy.
" 31. *Moose Factory, St. Johns.* Lefroy.
" 31. *Dunino, Engl.* Glaisher.
*Feb. 1.[1] *Fort Simpson, Lewis and Pelly.* Lefroy.
* " 1. *Moose Factory, Albany, H. B. T.* Lefroy.
* " 1. *Kingston, Toronto, St. Johns.* Lefroy.
" 2. *Lewis and Pelly.* Lefroy.
" 4. *Fort Simpson, Lewis and Pelly.* Lefroy.
" 4. *Highfield House, Engl.* Glaisher.
" 5. *Lewis and Pelly.* Lefroy.
" 6. *Fort Simpson, Halifax.* Lefroy.
" 7. *Lewis and Pelly?* Lefroy.
" 7. *Albany, H. B. T., Moose Factory.* Lefroy.
" 8. *Fort Simpson, Lewis and Pelly.* Lefroy.
" 9. *Fort Simpson.* Lefroy.
" 11. *Fort Simpson, Lewis and Pelly.* Lefroy.
" 12. *Fort Simpson.* Lefroy.
" 13. *Lewis and Pelly, Albany, H. B. T.* Lefroy.
" 13. *Moose Factory, Halifax.* Lefroy.
" 14. *Fort Simpson, Quebec, Montreal.* Lefroy.
* " 15. *Fort Simpson, Lewis and Pelly.* Lefroy.
* " 15. *Albany, H. B. T., Moose Factory.* Lefroy.

[1] The aurora was visible at Peel's River almost every night until the 22d.

*Feb. 15. *Kingston, Toronto, Halifax.* Lefroy.
* " 15. *At Sea, Ship Siddons, Lt. 46° N. Lg. 46° W.*
* " 15. *At Sea, Ship Hendrick Hudson, Lt. 47° N.*
* " 15. Smithsonian Records. [*Lg. 32° W.*
* " 15. *In England, from Lt. 51° to 55°.* Glaisher.
* " 16. *Fort Simpson, Lewis and Pelly.* Lefroy.
* " 16. *Moose Factory, Montreal.* Lefroy.
* " 16. *Matawagomingen, Quebec.* Lefroy.
* " 16. *Toronto? Kingston? London.* Lefroy.
* " 16. *Halifax.* Lefroy. *Dunino, Engl.* Glaisher.
* " 16. *At Sea, Ship Siddons, Lt. 47° N. Lg. 40° W.*
* " 16. *At Sea, Ship Hendrick Hudson, Lt. 47° N.*
* " 16. Smithsonian Records. [*Lg. 36° W.*
* " 17. *Fort Simpson, Lewis and Pelly.* Lefroy.
* " 17. *Moose Factory, Matawagomingen.* Lefroy.
* " 17. *Albany, Montreal, Kingston.* Lefroy.
* " 17. *Quebec, Halifax, St. Johns.* Lefroy.
* " 17. *Highfield House, Durham.* Glaisher.
* " 17. *North Shields.* Glaisher.
* " 18. *Lewis and Pelly, Moose Factory.* Lefroy.
* " 18. *Quebec, Matawagomingen.* Lefroy.
* " 18. *Albany, H. B. T., Montreal.* Lefroy.
* " 18. *Toronto, Kingston.* Lefroy.
* " 18. *London, Halifax, St. Johns.* Lefroy.
* " 18. *At Sea, Ship Hendrick Hudson, Lt. 47° N.*
* " 18. Smithsonian Records. [*Lg. 43° W.*
* " 18. *In England, from Lt. 50° to 57°.* Glaisher.
* " 19. *Fort Simpson, Peel's River.* Lefroy.
* " 19. *Lewis and Pelly, Moose Factory.* Lefroy.
* " 19. *Albany, Sault St. Marie, Kingston.* Lefroy.
* " 19. *Quebec, Toronto, Montreal.* Lefroy.
* " 19. *London, Halifax, St. Johns.* Lefroy.
* " 19. *At Sea, Ship Hendrick Hudson, Lt. 47° N.*
* " 19. Smithsonian Records. [*Lg. 44° W.*
* " 19. *In England, from Lt. 49° to 57°.* Glaisher.
* " 20. *Fort Simpson, Lewis and Pelly.* Lefroy.
* " 20. *Moose Factory, Montreal.* Lefroy.
* " 20. *Quebec, Kingston, Toronto.* Lefroy.
* " 20. *At Sea, Barque Kepler, Lt. 35° N. Lg. 49° W.*
* " 20. *At Sea, Ship Constantine, Lt. 51° N. Lg. 15° W.*
* " 20. Smithsonian Institution.
* " 20. *Helston, Norwich, Engl.* Glaisher.
* " 21. *Fort Simpson, Quebec.* Lefroy.
* " 21. *Lewis and Pelly, St. Johns.* Lefroy.
* " 21. *Helston, Grantham, Highfield House,*
* " 21. *Gainsborough, Wakefield, Stonyhurst,*
* " 21. *Whitehaven, Durham, Glasgow.* Glaisher.
" 22. *Highfield House, Engl.* Glaisher.

Feb. 23. *Peel's River, Albany, H. B. T.* Lefroy.
" 23. *Toronto, Halifax.* Lefroy.
" 23. *Stonyhurst, Durham, Engl.* Glaisher.
" 24. *Peel's River, Ship Karius at Sitka.* Lefroy.
" 25. *Ship Karius at Sitka.* Lefroy.
" 25. *Highfield House, Engl.* Glaisher.
* " 26. *Lewis and Pelly? Moose Factory.* Lefroy.
* " 26. *Highfield House.* Glaisher.
* " 27. *Peel's River, Lewis and Pelly.* Lefroy.
* " 27. *Montreal, Moose Factory.* Lefroy.
* " 27. *Quebec, Halifax, St. Johns.* Lefroy.
* " 27. *Durham, North Shields, Dunino.* Glaisher.
" 28. *Lewis and Pelly, St. Johns.* Lefroy.
" 28. *Ship Karius at Sitka.* Lefroy.
" 28. *Aylesbury, Engl.* Glaisher.
" 29. *Lewis and Pelly, Moose Factory.* Lefroy.
March 1. *Lewis and Pelly.* Lefroy.
" 1. *Moose Factory, Halifax.* Lefroy.
" 2. *Fort Simpson, Moose Factory?* Lefroy.
" 2. *Highfield House, Engl.* Glaisher.
* " 4. *Fort Simpson.* Lefroy.
" 5. *Lewis and Pelly, Moose Factory.* Lefroy.
" 5. *Highfield House, Engl.* Glaisher.
* " 6. *Lewis and Pelly, Fort Simpson.* Lefroy.
* " 6. *Moose Factory.* Lefroy.
* " 7. *Albany, H. B. T., Moose Factory.* Lefroy.
* " 7. *Peel's River, Quebec.* Lefroy.
* " 7. *Lewis and Pelly, Halifax.* Lefroy.
" 8. *Lewis and Pelly, Fort Simpson.* Lefroy.
* " 9. *Fort Simpson, Albany, H. B. T.* Lefroy.
* " 9. *Lewis and Pelly, St. Johns.* Lefroy.
* " 10. *Lewis and Pelly.* Lefroy.
* " 10. *Moose Factory, Toronto.* Lefroy.
" 11. *Fort Simpson, Kingston.* Lefroy.
" 11. *St. Johns, Halifax?* Lefroy.
* " 12. *Moose Factory, Lewis and Pelly.* Lefroy.
" 13. *Fort Simpson, Moose Factory?* Lefroy.
" 13. *Peel's River, Albany, H. B. T.* Lefroy.
" 13. *Lewis and Pelly, Halifax.* Lefroy.
" 14. *Fort Simpson, London.* Lefroy.
" 14. *Lewis and Pelly.* Lefroy.
* " 15. *Peel's River.* Lefroy.
* " 16. *Fort Simpson, Moose Factory.* Lefroy.
* " 16. *Lewis and Pelly, Peel's River.* Lefroy.
* " 16. *Albany.* Lefroy. *Portsmouth, N. H.*[1]
" 17. *Fort Simpson, Moose Factory.* Lefroy.
" 17. *Lewis and Pelly, Halifax.* Lefroy.

[1] Portsmouth Journal.

March 17. *Essex Coast.*[1] Lefroy.
" 18. *Fort Simpson, Moose Factory.* Lefroy.
" 18. *Albany, H. B. T., Toronto.* Lefroy.
* " 19. *Moose Factory, Kingston.* Lefroy.
* " 19. *Albany, H. B. T.* Lefroy.
* " 20. *Fort Simpson, Moose Factory.* Lefroy.
* " 20. *Albany, H. B. T., Toronto.* Lefroy.
* " 20. *Halifax.* Lefroy. *Stonyhurst.* Glaisher.
* " 21. *Moose Factory, Albang, H. B. T.* Lefroy.
* " 21. *Lewis and Pelly, Toronto.* Lefroy.
* " 21. *Hawarden, Engl.* Glaisher.
" 22. *Moose Factory, Albany, H. B. T.* Lefroy.
" 22. *Lewis and Pelly? Halifax.* Lefroy.
* " 25. *Stonyhurst, Engl.* Glaisher.
* " 26. *Fort Simpson, Lewis and Pelly.* Lefroy.
* " 26. *Sault St. Marie, Toronto.* Lefroy.
* " 26. *Kingston, London, Halifax.* Lefroy.
" 28. *Fort Simpson, Moose Factory.* Lefroy.
" 28. *Albany, H.B.T.* Lefroy. *Highfield House.*
* " 29. *Fort Simpson, Moose Factory? Quebec.* L.
" 30. *Moose Factory.* Lefroy.
* " 31. *Lewis and Pelly, Toronto.* Lefroy.
* " 31. *Kingston, London, Halifax.* Lefroy.
* " 31. *Stonyhurst, Engl.* Glaisher.
April 1. *At Sea, Ship Roscius, Lt. 51° N. Lg. 7° W.*
" 1. Smithsonian Records.
" 1. *Highfield House, Engl.* Glaisher.
" 3. *Quebec, Toronto?* Lefroy.
" 4. *Lewis and Pelly, Montreal.* Lefroy.
" 4. *Kingston, Halifax.* Lefroy.
" 5. *Halifax.* Lefroy.
" 6. *Fort Simpson, Halifax.* Lefroy.
" 6. *Lewis and Pelly?* Lefroy.
* " 8. *Kingston, London.* Lefroy.
* " 9. *Fort Simpson, Toronto.* Lefroy.
* " 9. *Matawagomingen, London.* Lefroy.
* " 9. *Kingston, St. Johns.* Lefroy.
* " 9. *Stonyhurst, Engl.* Glaisher.
* " 10. *Fort Simpson, Lewis and Pelly.* Lefroy.
* " 10. *Matawagomingen, Quebec.* Lefroy.
* " 10. *Toronto, Kingston, London.* Lefroy.
" 11. *Lewis and Pelly.* Lefroy.
" 11. *Stonyhurst, Engl.* Lefroy.
* " 12. *Lewis and Pelly.* Lefroy.
* " 12. *Sault St. Marie, Toronto.* Lefroy.
* " 14. *Lewis and Pelly, Toronto.* Lefroy.
* " 14. *Glasgow.* Lefroy.

[1] Between Blackwater and Crouch Rivers.

*April 15. *Matawagomingen.* Lefroy.
* " 15. *London, Toronto.* Lefroy.
* " 15. *At Sea, Ship Garrick, Lt. 47° N. Lg. 29° W.*
* " 15. Smithsonian Records.
* " 16. *Toronto.* Lefroy. *Dunino.* Glaisher.
* " 18. *Fort Simpson, Lewis and Pelly.* Lefroy.
* " 18. *Sault St. Marie.* Lefroy. *Stonyhurst.* Glaisher.
* " 20. *Kingston? Toronto? St. Johns.* Lefroy.
* " 20. *Rose Hill, Engl.* Glaisher.
" 21. *Oxford, Highfield House.* Glaisher.
* " 22. *Fort Simpson? Lewis and Pelly.* Lefroy.
* " 22. *Toronto, London, Halifax.* Lefroy.
* " 22. *Highfield House, Engl.* Glaisher.
" 23. *Lewis and Pelly, London.* Lefroy.
" 23. *Matawagomingen.* Lefroy.
" 23. *Highfield House, Engl.* Glaisher.
" 24. *Lewis and Pelly.* Lefroy.
" 26. *Highfield House, Engl.* Glaisher.
" 29. *St. Johns.* Lefroy.
May 1. *Fort Simpson.* Lefroy.
" 1. *Stone, Engl.* Glaisher.
" 2. *Stone, Hartwell Rectory, Engl.* Glaisher.
* " 3. *Hartwell Rectory, Highfield House.* Glai-
* " 5. *Matawagomingen.* Lefroy. [sher.
* " 5. *Toronto? St. Johns.* Lefroy.
" 6. *St. Johns.* Lefroy.
" 7. *Toronto?* Lefroy.
* " 8. *Montreal, Kingston, Toronto.* Lefroy.
* " 9. *Matawagomingen.* Lefroy.
* " 9. *Kingston, Toronto.* Lefroy.
* " 10. *Kingston, Toronto.* Lefroy.
* " 10. *London, Halifax.* Lefroy.
" 12. *Toronto.* Lefroy.
" 13. *Quebec.* Lefroy.
* " 17. *Toronto.* Lefroy.
* " 18. *Quebec, Montreal.* Lefroy.
* " 18. *Kingston, Toronto? Halifax.* Lefroy.
* " 19. *Quebec, Matawagomingen.* Lefroy.
* " 19. *Toronto, Halifax.* Lefroy.
* " 20. *Montreal, Toronto.* Lefroy.
* " 21. *Toronto, Halifax.* Lefroy.
* " 21. *At Sea, Ship Yorktown, Lt. 40° N. Lg. 72° W.*
" 22. *Montreal, Toronto, St. Johns.* Lefroy.
" 24. *Quebec, Sault St. Marie.* Lefroy.
" 24. *St. Johns, Toronto.* Lefroy.
" 26. *Kingston.* Lefroy.
" 27. *Grosse Isle (below Quebec).* Lefroy.
" 27. *Quebec, Montreal, Toronto.* Lefroy.

June 3. *Toronto.* Lefroy.
* " 5. *Grosse Isle, Quebec.* Lefroy.
* " 5. *Montreal, Kingston, Toronto.* Lefroy.
* " 5. Smithsonian Records. [*Long.* 79°.
" 7. *At Sea, Ship White Squall, Lat. 53° N?*
* " 10. *Toronto.* Lefroy.
* " 11. *Grosse Isle, Quebec, Montreal.* Lefroy.
* " 11. *Kingston, Toronto, Halifax.* Lefroy.
* " 11. *New Haven.* Smith. Rec. *Greenwich.* Gl.
" 12. *Grosse Isle, Quebec.* Lefroy.
" 12. *Montreal, Halifax.* Lefroy.
" 12. *At Sea, Ship Garrick, Lt. 40° N. Lg. 69° W.*
" 12. Smithsonian Records.
* " 15. *Quebec, Kingston, Toronto.* Lefroy.
* " 16. *Kingston, Toronto.* Lefroy.
" 17. *Quebec, Toronto.* Lefroy.
" 18. *Kingston, Toronto.* Lefroy.
" 19. *Stone, Engl.* Glaisher.
" 20. *Kingston.* Lefroy.
" 22. *Toronto.* Lefroy.
" 24. *Highfield House, Engl.* Glaisher.
" 26. *Halifax?* Lefroy.
July 1. *Penetanguishene, Halifax.* Lefroy.
" 2. *Penetanguishene.* Lefroy.
* " 3. *Great Britain.* Glaisher.
" 4. *Halifax.* Lefroy.
* " 5. *Penetanguishene, Halifax.* Lefroy.
* " 5. *Quebec, Grosse Isle.* Lefroy.
* " 5. *Kingston, Toronto.* Lefroy.
* " 6. *Penetanguishene, Quebec.* Lefroy.
* " 6. *Grosse Isle, Kingston.* Lefroy.
* " 6. *Toronto, Montreal.* Lefroy.
* " 6. *Halifax.* Lefroy. *Great Britain.* Glaisher.
* " 7. *Quebec, Grosse Isle.* Lefroy.
* " 7. *Kingston, Toronto, Montreal.* Lefroy.
* " 8. *Toronto?* Lefroy.
* " 9. *Penetanguishene, Quebec.* Lefroy.
* " 9. *Toronto, Sault St. Marie, Halifax.* Lefroy.
* " 10. *Quebec, Grosse Isle.* Lefroy.
* " 10. *Penetanguishene, Kingston.* Lefroy.
* " 10. *Toronto, Montreal, Halifax.* Lefroy.
* " 12. *Grosse Isle, Kingston.* Lefroy.
* " 12. *Toronto, Montreal.* Lefroy.
* " 13. *Toronto, Montreal.* Lefroy.
* " 13. *Great Britain.* Glaisher.
" 14. *Penetanguishene.* Lefroy.
" 14. *Great Britain.* Glaisher.
" 15. *Quebec, Grosse Isle.* Lefroy.

July 15. *Toronto, Montreal.* Lefroy.
" 19. *Penetanguishene.* Lefroy.
" 23. *Kingston, Toronto, Halifax.* Lefroy.
" 24. *Montreal, Halifax.* Lefroy.
" 26. *Penetanguishene.* Lefroy.
" 27. *Halifax, Kingston.* Lefroy.
" 28. *Portage la loche.* Lefroy.
" 29. *Penetanguishene.* Lefroy.
" 30. *Clear Water River.* Lefroy.
" 31. *Toronto.* Lefroy.
Aug. 1. *Athabasca River.* Lefroy.
" 3. *Halifax?* Lefroy.
* " 4. *Fort Simpson.* Lefroy.
" 5. *Fort Simpson, Slave River.* Lefroy.
" 5. *Portage Brulé.* Lefroy.
" 6. *Salt River, drifting below.* Lefroy.
" 6. *Penetanguishene, Grosse Isle.* Lefroy.
" 6. *Quebec, Montreal, Toronto.* Lefroy.
" 7. *Salt River, drifting below.* Lefroy.
" 8. *Fort Resolution, Halifax.* Lefroy.
" 8. *At Sea, Ship Plymouth Rock, Lat.* 47° *N.*
" 8. Smithsonian Records. [*Lg.* 21° *W.*
" 9. *Slave Lake, Quebec.* Lefroy.
* " 10. *Big Island, Grosse Island, Quebec.* Lefroy.
* " 10. *Penetanguishene, Toronto.* Lefroy.
* " 11. *Near Fort Simpson, Montreal.* Lefroy.
* " 11. *Penetanguishene, Toronto.* Lefroy.
* " 11. *Grosse Isle, Quebec.* Lefroy.
" 13. *Quebec.* Lefroy.
" 15. *Quebec.* Lefroy.
" 15. *At Sea, Ship Yorktown, Lt.* 42° *N. Lg.* 51° *W.*
" 15. Smithsonian Record.
" 19. *Quebec.* Lefroy.
" 22. *Lewis and Pelly.* Lefroy.
" 23. *Lewis and Pelly.* Lefroy.
" 23. *Toronto, Halifax.* Lefroy.
" 24. *Lewis and Pelly.* Lefroy.
" 24. *At Sea, Ship Ashburton, Lt.* 40° *N. Lg.* 65° *W.*
" 24. *At Sea. Ship Plymouth Rock, Lat.* 44° *N.*
" 24. Smithsonian Records. [*Lg.* 53½° *W.*
" 25. *Lewis and Pelly, Toronto.* Lefroy.
" 25. *Penetanguishene.* Lefroy.
" 26. *Toronto.* Lefroy. [*Lg.* 58° *W.*
" 26. *At Sea, Ship Plymouth Rock, Lat.* 43° *N.*
" 26. Smithsonian Records.
" 28. *Fort Simpson, Toronto.* Lefroy.
*Sept. 2. *Pelly River,* 120 *ms. below Ft. Selkirk.* Lef.
" 3. *Grosse Isle, Toronto.* Lefroy.
Sept. 3. *Penetanguishene.* Lefroy.
* " 4. *Fort Simpson, Grosse Isle, Quebec.* Lefroy.
* " 4. *Penetanguishene, Toronto.* Lefroy.
* " 5. *Pelly River, Fort Simpson.* Lefroy.
* " 5. *Fort George, Penetanguishene.* Lefroy.
* " 6. *Pelly River, Peel's River, Toronto.* Lefroy.
* " 6. *Fort George, Penetanguishene.* Lefroy.
" 7. *Pelly River, Fort Simpson.* Lefroy.
" 7. *Penetanguishene.* Lefroy.
" 8. *Pelly River, Fort Simpson.* Lefroy.
* " 9. *Pelly River, Peel's River.* Lefroy.
* " 9. *Fort Simpson, Fort George.* Lefroy.
* " 9. *Grosse Isle, Quebec.* Lefroy.
* " 10. *Peel's River, Fort Simpson.* Lefroy.
* " 10. *Fort George, Toronto.* Lefroy.
* " 11. *Peel's River, Fort Simpson.* Lefroy.
* " 11. *Fort George.* Lefroy. *Gt. Britain.* Glaisher.
* " 12. *Fort Simpson, Toronto.* Lefroy.
* " 13. *Quebec.* Lefroy.
" 15. *Pelly River.* Lefroy.
* " 16. *Pelly River, Peel's River, Toronto.* Lefroy.
* " 16. *Montreal, Penetanguishene.* Lefroy.
* " 17. *Peel's River, Penetanguishene.* Lefroy.
* " 17. *Toronto, Quebec.* Lefroy.
* " 17. *Montreal.* Lefroy. *Gt. Britain.* Glaisher.
* " 18. *Peel's River, Fort Simpson.* Lefroy.
* " 18. *Grosse Isle, Quebec.* Lefroy.
* " 18. *Montreal.* Lefroy. *Great Britain.* Glaisher?
* " 19. *Peel's River, Fort Simpson.* Lefroy.
* " 19. *Penetanguishene, Toronto.* Lefroy.
* " 19. *Kingston.* Lefroy. *Gt. Britain.* Glaisher?
* " 20. *Pelly River, Peel's River.* Lefroy.
* " 20. *Fort Simpson, Quebec.* Lefroy.
* " 20. *Halifax.* Lefroy. *Great Britain.* Glaisher?
* " 21. *Pelly River, Peel's River.* Lefroy.
* " 21. *Fort Simpson, Fort George.* Lefroy.
* " 21. *Toronto, Kingston.* Lefroy.
* " 21. *Halifax.* Lefroy. *Gt. Britain.* Glaisher?
* " 22. *Pelly River, Fort George.* Lefroy.
* " 22. *Toronto, Halifax.* Lefroy.
" 25. *Fort Simpson.* Lefroy.
" 28. *Quebec.* Lefroy.
* " 29. *Peel's River, Grosse Isle.* Lefroy.
* " 29. *Toronto, Quebec, Halifax.* Lefroy.
Oct 1. *Fort Simpson, Peel's River.* Lefroy.
" 1. *Pelly River.* Lefroy.
" 2. *Fort Simpson, Quebec, Toronto.* Lefroy.
" 3. *Fort Simpson.* Lefroy.

Oct. 4. *Kingston.* Lefroy.
* " 5. *Peel's River, Toronto, Kingston.* Lefroy.
* " 5. *Halifax.* Lefroy. *Stone, Engl.* Glaisher.
* " 6. *Toronto, Penetanguishene.* Lefroy.
* " 7. *Quebec.* Lefroy.
" 8. *Fort Simpson.* Lefroy.
" 11. *Pelly River, Penetanguishene.* Lefroy.
" 12. *Fort Simpson, Peel's River.* Lefroy.
" 12. *Quebec, Toronto.* Lefroy.
" 12. *Montreal, Kingston.* Lefroy.
* " 13. *Peel's River.* Lefroy.
" 16. *Peel's River, Toronto.* Lefroy.
" 17. *Fort Simpson, Peel's River, Quebec.* Lefroy.
* " 18. *Fort Simpson.* Lefroy.
* " 19. *Fort Simpson, Peel's River.* Lefroy.
* " 19. *Toronto, Kingston.* Lefroy.
* " 19. *Penetanguishene, Montreal.* Lefroy.
* " 20. *Peel's River, Quebec.* Lefroy.
* " 20. *Toronto, Montreal.* Lefroy.
* " 21. *Peel's River.* Lefroy.
" 23. *Fort Simpson, Peel's River.* Lefroy.
" 23. *Fort George.* Lefroy. *Stone, Engl.* Glaisher.
" 24. *Peel's River.* Lefroy. *Stone, Engl.* Glaisher.
" 25. *Fort Simpson, Peel's River.* Lefroy.
" 25. *Stone, Engl.* Glaisher.
" 26. *Fort Simpson.* Lefroy. *Stone, Engl.* Glaisher.
" 27. *Fort George.* Lefroy.
" 29. *Fort Simpson.* Lefroy.
" 31. *Fort Simpson, Peel's River.* Lefroy.
Nov. 1. *Peel's River.* Lefroy.
" 2. *Fort Simpson.* Lefroy.
" 3. *Fort Simpson.* Lefroy. *Stone, Oxford.* Glaisher.
" 3. *Nottingham, Liverpool, Dunino.* Glaisher.
" 5. *Fort Simpson.* Lefroy.
" 6. *Fort Simpson.* Lefroy.
" 7. *Hawarden, Engl.* Glaisher.
" 8. *Fort Simpson.* Lefroy. *Stonyhurst.* Glaisher.
" 9. *Fort Simpson.* Lefroy.
* " 10. *Peel's River, Quebec.* Lefroy.
* " 10. *Fort Simpson, Toronto.* Lefroy.
* " 11. *Peel's River, Toronto.* Lefroy.
* " 11. *Quebec,*[1] *Halifax.* Lefroy.
* " 11. *Lewisham, Greenwich.* Glaisher.
* " 12. *Fort Simpson, Slave Lake.* Lefroy.
* " 12. *Fort Resolution, Toronto.* Lefroy.
* " 12. *At Sea, Ship Eagle, Lt.* 48° *N. Lg.* 30° *W.*
* " 12. Smithsonian Records.

[1] And between Quebec and Three Rivers.

*Nov. 13. *Peel's River, Toronto.* Lefroy.
* " 13. *Quebec, Kingston, Halifax.* Lefroy.
* " 14. *Fort Simpson, Toronto.* Lefroy.
* " 14. [1]*At Sea, Ship Senator, Lt.* 52° *N. Lg.* 66° *W.*
* " 14. Smithsonian Records.
* " 15. *Peel's River, Fort Simpson.* Lefroy.
* " 16. *Fort Simpson, Quebec, Toronto.* Lefroy.
* " 17. *Peel's River, Toronto.* Lefroy.
* " 18. *Peel's River.* Lefroy. *Stone, Engl.* Glaisher.
* " 19. *Peel's River.* Lefroy.
" 20. *Peel's River, Fort Simpson.* Lefroy.
" 21. *Peel's River.* Lefroy.
" 22. *Peel's River.* Lefroy.
" 23. *Peel's River, Fort George.* Lefroy.
" 24. *Fort Simpson.* Lefroy.
* " 25. *Fort Simpson, Fort George.* Lefroy.
" 27. *Toronto.* Lefroy.
" 28. *Peel's River, Toronto.* Lefroy.
" 29. *Peel's River, Fort George.* Lefroy.
" 30. *Quebec, Toronto.* Lefroy.
" 30. *Liverpool, Engl.* Glaisher.
Dec. 1. *Fort Simpson.* Lefroy.
* " 2. *Fort Simpson, Kingston.* Lefroy.
* " 2. *Pelly River.* Lefroy.
* " 3. *Fort Simpson, Peel's River.* Lefroy.
* " 4. *Fort Simpson, Peel's River.* Lefroy.
* " 4. *Pelly River.* Lefroy.
* " 5. *Fort Simpson, Peel's River.* Lefroy.
* " 5. *Pelly River.* Lefroy.
* " 6. *Peel's River, Pelly River.* Lefroy.
* " 6. *North Shields, Dunino, Engl.* Glaisher.
* " 7. *Fort Simpson, Peel's River.* Lefroy.
* " 7. *Pelly River.* Lefroy.
* " 8. *Fort Simpson, Peel's River.* Lefroy.
* " 8. *Pelly River.* Lefroy.
* " 9. *Fort Simpson, Peel's River.* Lefroy.
* " 9. *Quebec, Sturgeon River.* Lefroy.
* " 9. *Toronto.* Lefroy. *Rose Hill.* Glaisher.
* " 10. *Fort Simpson, Peel's River, Quebec.* Lefroy.
* " 10. *Pelly River.* Lefroy. *Dunino.* Glaisher.
* " 11. *Fort Simpson. Peel's River.* Lefroy.
* " 11. *Pelly River, Toronto.* Lefroy.
* " 12. *Pelly River, Quebec.* Lefroy. *Stone.* Glaisher.
* " 13. *Fort Simpson, Peel's River.* Lefroy.
* " 13. *Pelly River, Sturgeon River.* Lefroy.
* " 14. *Fort Simpson, Peel's River.* Lefroy.
* " 14. *Pelly River, Quebec.* Lefroy.

[1] Aurora Australis.

*Dec. 14. *At Sea, Ship Plymouth Rock, Lat.* 53° *N.*
* " 14. Smithsonian Records. [*Long.* 34° *W.*
* " 15. *Fort Simpson, Fort Resolution.* Lefroy.
* " 15. *Peel's River.* Lefroy. *Grantham.* Glaisher.
" 16. *Fort Simpson, Peel's River.* Lefroy.
" 16. *Between Fort R. and Athabasca.* Lefroy.
* " 17. *Fort Simpson, Peel's River.* Lefroy.
* " 17. *Quebec, Toronto.* Lefroy.
* " 17. *Between Fort R. and Athabasca.* Lefroy.
* " 18. *Fort Simpson, Sturgeon River.* Lefroy.
* " 18. *Between Fort R. and Athabasca.* Lefroy.
* " 18. *At Sea, Ship Plymouth Rock, Lat.* 51° *N.*
" 19. *Fort George.* Lefroy. [*Long.* 41° *W.*
" 19. *Between Fort R. and Athabasca.* Lefroy.
" 20. *Between Fort R. and Athabasca.* Lefroy.
" 20. *Quebec.* Lefroy. *Stone, Engl.* Glaisher.
" 21. *Between Fort R. and Athabasca.* Lefroy.
" 22. *Peel's River, Fort George.* Lefroy.
" 23. *Between Fort R. and Athabasca.* Lefroy.
" 23. *Peel's River.* Lefroy.
" 24. *Fort Simpson.* Lefroy.
" 27. *Fort Simpson, Fort George.* Lefroy.
" 27. *Chipewyan.* Lefroy.
* " 28. *Fort George, Quebec.* Lefroy.
* " 28. *Chipewyan, Toronto.* Lefroy.
* " 29. *Fort Simpson, Fort Chipewyan.* Lefroy.
* " 29. *Quebec, Sturgeon River.* Lefroy.
" 30. *Fort George, Fort Simpson.* Lefroy.
" 30. *Fort Chipewyan.* Lefroy.
" 31. *Fort George, Fort Chipewyan.* Lefroy

1853.

Jan. 1. *Fort Simpson, Peel's River.* Lefroy.
" 2. *Peel's River, Fort George, H. B. T.* Lefroy.
" 3. *Peel's River, Fort George.* Lefroy.
* " 4. *Fort Simpson, Peel's River.* Lefroy.
* " 4. *Hawarden, Engl.* Glaisher.
" 5. *Fort Simpson, Peel's River.* Lefroy.
" 5. *Fort George.* Lefroy.
" 5. *Hawarden, Stone, Engl.* Glaisher.
* " 6. *Fort Simpson, Peel's River.* Lefroy.
* " 6. *Fort George, Toronto.* Lefroy.
" 7. *Peel's River, Fort George.* Lefroy.
" 7. *At Sea, Lt.* 42° 25′ *N. Lg.* 68° 58′ *W.*
" 7. *Clifton, Rose Hill, Oxford.* Glaisher.
" 7. *Stonyhurst, Dunino.* Glaisher.
* " 8. *Peel's River, Fort George, Quebec.* Lefroy.
* " 8. *Stonyhurst, Engl.* Glaisher.

*Jan. 9. *Peel's River.* Lefroy.
* " 10. *Peel's River, Fort Simpson.* Lefroy.
* " 10. *Isle à la Crosse, Quebec.* Lefroy.
" 11. *Peel's River, Fort George.* Lefroy.
" 11. *Sturgeon River.* Lefroy.
* " 12. *Peel's River, Fort George.* Lefroy.
* " 12. *Sturgeon River.* Lefroy.
* " 13. *Peel's River, Fort Simpson.* Lefroy.
* " 13. *Quebec, Sturgeon River.* Lefroy.
* " 14. *Fort Simpson, Peel's River.* Lefroy.
" 15. *Peel's River.* Lefroy. *Clifton, Engl.* Glaisher.
" 16. *Fort Simpson, Peel's River.* Lefroy.
" 17. *Peel's River.* Lefroy.
* " 18. *Isle à la Crosse.* Lefroy.
" 19. *Fort George.* Lefroy.
" 20. *Fort Simpson, Isle à la Crosse.* Lefroy.
" 21. *Fort Simpson.* Lefroy.
" 22. *Fort Simpson, Quebec.* Lefroy.
" 23. *En route to Carleton, H. B. T.* Lefroy.
" 24. *Fort Simpson.* Lefroy.
* " 27. *Peel's River.* Lefroy.
* " 28. *Fort Simpson, Peel's River.* Lefroy.
* " 28. *En route to Carlton, H. B. T.* Lefroy.
* " 29. *Peel's River, Fort George.* Lefroy.
* " 30. *Fort Simpson, Peel's River, Toronto.* Lefroy.
* " 31. *Fort Simpson.* Lefroy.
* " 31. *Durham, Grantham, Engl.* Glaisher.
*Feb. 1. *Peel's River, Quebec.* Lefroy.
* " 1. *Sturgeon River, Toronto.* Lefroy.
" 2. *Peel's River.* Lefroy.
" 3. *Peel's River, Fort George.* Lefroy.
" 3. *En route for Swan River.* Lefroy.
* " 4. *Fort Simpson, Peel's River.* Lefroy.
" 5. *Peel's River, Fort George.* Lefroy.
" 6. *Fort Simpson, Sturgeon River.* Lefroy.
" 7. *Fort Simpson.* Lefroy.
* " 8. *Fort Simpson, Peel's River.* Lefroy.
" 9. *Peel's River, En route for Swan River.* Le.
" 10. *Fort Simpson, En route for Swan River.* Le.
" 11. *Peel's River, En route for Swan River.* Le.
" 11. *Quebec, Sturgeon River, Toronto.* Lefroy.
" 12. *Peel's River.* Lefroy.
* " 13. *Fort Simpson, Peel's River.* Lefroy.
* " 13. *Kingston.* Lefroy. *Toronto.* Kingston.
* " 14. *Fort Simpson, Peel's River.* Lefroy.
* " 14. *Quebec, Sturgeon River.* Lefroy.
* " 14. *En route for Swan River.* Lefroy.
* " 14. *Kingston.* Lefroy. *Toronto.* Kingston.

*Feb. 14. *Whitehaven, Engl.* Glaisher.
* " 14. *Christiania.*[1] Fearnley.
" 15. *Fort Simpson, Fort George.* Lefroy.
" 15. *En route for Swan River.* Lefroy.
" 15. *Nottingham, Engl.* Glaisher.
" 16. *Fort Simpson, Peel's River.* Lefroy.
" 16. *En route for Red River, Fort George.* Le.
" 16. *North Shields, Engl.* Glaisher.
" 17. *Fort George, Quebec.* Lefroy.
" 17. *North Shields, Engl.* Glaisher. [Lefroy.
" 18. *Fort Simpson, Peel's River, Fort George.*
" 19. *Fort Simpson, Peel's River.* Lefroy.
" 19. *Fort George.* Lefroy.
* " 20. *Fort Simpson, Peel's River.* Lefroy.
* " 20. *Fort George, Quebec.* Lefroy.
* " 21. *Fort Simpson, Peel's River.* Lefroy.
* " 21. *Fort George.* Lefroy.
" 22. *Fort Simpson, Fort George.* Lefroy.
" 23. *Fort George.* Lefroy. *Nottingham.* Glaisher.
" 24. *Fort George.* Lefroy.
" 25. *Fort Simpson, Fort George.* Lefroy.
" 26. *Fort Simpson.* Lefroy. *Guernsey.* Lefroy.
" 27. *Fort Simpson, Quebec.* Lefroy.
" 27. *Nottingham, Hawarden.* Glaisher.
" 27. *Stonyhurst, Whitehaven.* Glaisher.
" 27. *Christiania.* Fearnley.
* " 28. *Fort George.* Lefroy.
* " 28. *Stone, Hartwell Factory.* Glaisher.
* " 28. *Christiania.* Fearnley.
*March 1. *Fort Simpson, En route for St. Paul.* Lefroy.
* " 1. *Fort George.* Lefroy. *Toronto.* Kingston.
" 2. *Fort Simpson, En route for St. Paul.* Lef.
" 2. *Fort George.* Lefroy. *Toronto.* Kingston.
" 3. *Fort Simpson, Fort George.* Lefroy.
" 4. *Fort Simpson, Fort George.* Lefroy.
" 4. *Quebec, Sturgeon River.* Lefroy.
" 5. *Fort George.* Lefroy. *Toronto.* Kingston.
" 6. *Fort Simpson.* Lefroy.
* " 7. *Fort Simpson, En route for St. Paul.* Lef.
* " 7. *Fort George, Quebec.* Lefroy. *Toronto.* K.
* " 7. *At Sea, Ship New World, Lt.* 51° *N. Lg.*
* " 7. *Midhurst, Clifton.* Glaisher. [18½° *W.*
* " 7. *Hawarden, Durham.* Glaisher.
* " 8. *Fort Simpson, En route for St. Paul.* Lef.
* " 8. *Fort George, Quebec, Sturgeon River.* Lef.
* " 8. *Clifton, Stonyhurst, Durham.* Glaisher.

[1] Meteorologische Beobachtungen aufgezeichnet auf Christiania Observatorium.

*March 9. *Fort Simpson, Fort George.* Lefroy.
* " 9. *Penetanguishene.* Lefroy.
* " 9. *Sturgeon River.* Lefroy. *Toronto.* Kingston.
* " 9. *At Sea, Ship Roscius, Lt.* 42° *N. Lg.* 56° *W.*
* " 9. Smithsonian Records.
* " 10. *Fort Simpson, Fort George, Quebec.* Lefroy.
* " 10. *Sturgeon River.* Lefroy. *Dunino.* Glaish.
* " 11. *Fort Simpson, Sturgeon River.* Lefroy.
* " 11. *Penetanguishene.* Lefroy. *Dunino.* Glaish.
* " 12. *Fort Simpson.* Lefroy.
* " 13. *Quebec, Sturgeon River.* Lefroy.
* " 13. *Kingston.* Lefroy. *Toronto.* Kingston.
* " 14. *Fort Simpson, Quebec, Sturgeon River.* Lef.
* " 17. *Bicester, Stone, Hartwell Rectory.* Glaisher.
* " 18. *Fort Simpson, Fort George.* Lefroy.
" 19. *Fort Simpson, Fort George, Quebec.* Lefroy.
" 21. *Fort Simpson.* Lefroy. *Holkham, Engl.* Gl.
" 23. *Fort Simpson.* Lefroy.
" 24. *Fort Simpson.* Lefroy.
" 26. *Fort Simpson.* Lefroy.
* " 27. *Fort Simpson.* Lefroy.
" 28. *Fort Simpson.* Lefroy. *Toronto.* Kingston.
" 29. *Stone, Engl.* Glaisher.
* " 30. *Fort Simpson.* Lefroy. *Toronto.* Kingston.
* " 30. *Penetanguishene.* Lefroy.
* " 31. *Fort Simpson, Sturgeon River.* Lefroy.
*April 1. *Fort Simpson, Fort George.* Lefroy.
* " 1. *Sturgeon River.* Lefroy. *Toronto.* Kingston.
* " 1. *Penetanguishene.* Lefroy.
" 3. *Fort Simpson.* Lefroy.
" 4. *Fort Simpson, Fort George.* Lefroy.
" 4. *Penetanguishene.* Lefroy.
* " 5. *Fort Simpson, Fort George.* Lefroy.
* " 5. *Sturgeon River.* Lefroy. *Toronto.* Kingston.
* " 5. *At Sea, Ship New World, Lt.* 41° *N. Lg.* 66° *W.*
* " 5. *At Sea, Ship Yorktown, Lt.* 50° *N. Lg.* 28° *W.*
* " 5. Smithsonian Records.
* " 5. *Nottingham, Hawarden.* Glaisher.
* " 5. *Greenwich, Stone, Hartwell House.* Glaish.
* " 5. *Hartwell Rectory, Cardington, Grantham.*
* " 6. *Fort Simpson, Sturgeon River.* Lefroy.
* " 6. *Penetanguishene.* Lefroy. *Toronto.* Kingston.
* " 6. *Hawarden, Durham, Engl.* Glaisher.
* " 7. *Fort George.* Lefroy. *Toronto.* Kingston.
* " 7. *At Sea, Ship Yorktown, Lt.* 46° *N. Lg.* 32° *W.*
* " 7. *At Sea, Ship Mazatlan, Lt.* 40° *N. Lg.* 71½.
* " 7. Smithsonian Records.
* " 7. *Stone, Hartwell Rectory, Hawarden.* Gl.

*April 8. *At Sea, Ship New World, Lt. 40° N. Lg. 68° W.*
* " 8. *At Sea, Ship Yorktown, Lt. 46° N. Lg. 35° W.*
* " 8. Smithsonian Records.
* " 8. *Hawarden, Stonyhurst, Durham.* Glaisher.
* " 9. *Fort Simpson.* Lefroy. *Toronto.* Kingston.
* " 9. *At Sea, Ship Yorktown, Lt. 45½° N. Lg. 39° W.*
* " 9. Smithsonian Records. [ton.
* " 10. *Fort George, Sturgeon River, Toronto.* Kings-
* " 11. *Fort Simpson.* Lefroy.
* " 12. *Fort Simpson.* Lefroy.
" 13. *Fort Simpson.* Lefroy.
" 14. *Fort Simpson.* Lefroy.
" 15. *Fort Simpson.* Lefroy.
" 16. *Fort Simpson.* Lefroy.
" 17. *Fort Simpson, Sturgeon River.* Lefroy.
" 17. *Penetanguishene.* Lefroy.
" 18. *Fort Simpson, Penetanguishene?* Lefroy.
" 19. *Fort Simpson, Penetanguishene.* Lefroy.
" 20. *Fort Simpson, Penetanguishene.* Lefroy.
" 21. *Fort Stimpson.* Lefroy.
" 22. *Fort Stimpson, Sturgeon River.* Lefroy.
" 23. *Fort Stimpson, Sturgeon River.* Lefroy.
" 24. *Sturgeon River.* Lefroy. *Hawarden.* Gl.
" 25. *Fort George, Sturgeon River.* Lefroy.
" 25. *Penetanguishene.* Lefroy.
" 29. *Fort Simpson, Sturgeon River.* Lefroy.
" 29. *Penetanguishene.* Lefroy. *Toronto.* Kingston.
" 30. *Fort Simpson,* Lefroy.
*May 2. *Toronto.* Kingston.
" 3. *Toronto.* Kingston.
* " 4. *Toronto.* Kingston.
* " 4. *Hawarden, North Shields.* Glaisher.
" 8. *Toronto.* Kingston.
" 14. *Manchester, Engl.* Glaisher.
* " 24. *Toronto.* Kingston. *Nottingham.* Glaisher.
" 28. *Toronto.* Kingston.
" 29. *Toronto.* Kingston.
* " 30. *Toronto.* Kingston.
*June 1. *Toronto.* Kingston.
" 11. *Toronto.* Kingston.
" 22. *Greenwich.* Glaisher.
" 25. *Toronto.* Kingston.
" 27. *Toronto.* Kingston.
" 29. *Toronto.* Kingston.
July 8. *Toronto.* Kingston.
* " 10. *Toronto.* Kingston.
* " 11. *Toronto.* Kingston.
* " 12. *Toronto.* Kingston.
July 15. *Toronto.* Kingston.
" 25. *Toronto.* Kingston.
*Aug. 7. *Christiania.* Fearnley.
" 19. *Christiania.* Fearnley.
" 24. *Toronto.* Kingston.
" 25. *Christiania.* Fearnley.
* " 31. *Toronto.* Kingston.
*Sept. 1. *Toronto.* Kingston.
* " 2. *Toronto.* Kingston. *Christiania.* Fearnley.
* " 2. *Greenwich, Exeter, Clifton.* Glaisher.
* " 2. *Hawarden, Manchester, Engl.* Glaisher.
* " 2. *Durham, Dunino, Engl.* Glaisher.
* " 3. *Toronto.* Kingston. *Christiania.* Fearnley.
* " 4. *Christiania.* Fearnley.
* " 10. *Christiania.* Fearnley.
" 11. *Toronto.* Kingston.
* " 12. *Christiania.* Fearnley.
* " 18. *Toronto.* Kingston. *Christiania.* Fearnley.
* " 24. *Toronto.* Kingston.
" 27. *Christiania.* Fearnley.
* " 28. *Toronto.* Kingston.
" 29. *Christiania.* Fearnley.
Oct. 3. *Christiania.* Fearnley.
" 9. *Toronto.* Kingston.
" 10. *Toronto.* Kingston.
" 11. *Toronto.* Kingston.
" 12. *Toronto.* Kingston.
" 17. *Toronto.* Kingston. *Durham.* Glaisher.
* " 23. *Dunino, Engl.* Glaisher.
" 25. *Nottingham, Durham, Engl.* Glaisher.
" 25. *Dunino, Arbroath, Engl.* Glaisher.
" 29. *Whitehaven, Engl.* Glaisher.
" 30. *Dunino.* Glaisher. *Christiania.* Fearnley.
* " 31. *Toronto.* Kingston.
* " 31. *Clifton, Lewisham, Greenwich.* Glaisher.
* " 31. *Cardington, Norwich, Engl.* Glaisher.
* " 31. *Grantham, Nottingham, Engl.* Glaisher.
*Nov. 1. *Oxford, Engl.* Glaisher.
* " 2. *Whitehaven, Engl.* Glaisher.
" 8. *Isle of Man, Durham, North Shields,*
" 8. *Dunino, Arbroath, Engl.* Glaisher.
* " 9. *Toronto.* Kingston. *Nottingham.* Glaisher
* " 9. *Christiania.* Fearnley.
" 10. *Toronto.* Kingston.
" 11. *Dunino.* Glaisher.
* " 19. *Christiania.* Fearnley.
" 22. *Christiania.* Fearnley.
" 22. *North Shields.* Glaisher.

Nov. 22. *Isle of Man, Durham.* Glaisher.
" 22. *Stone, Stonyhurst.* Glaisher.
*Dec. 4. *Toronto.* Kingston.
" 5. *Helston, Nottingham.* Glaisher.
* " 6. *Toronto.* Kingston. *Truro, Clifton.* Glaisher.
* " 6. *Dunino, Arbroath, Lewisham, Greenwich,*
* " 6. *Stonyhurst, Isle of Man, Whitehaven,*
* " 6. *Durham, North Shields.* Glaisher.
* " 6. *Christiania.* Fearnley.
* " 8. *Toronto.* Kingston. *Durham.* Glaisher.
* " 23. *Toronto.* Kingston. *Greenwich.* Glaisher.
* " 24. *Clifton.* Glaisher. *Christiania.* Fearnley.
" 25. *Toronto.* Kingston.
" 26. *Falmouth.* Glaisher.
" 27. *Falmouth.* Glaisher.
* " 28. *Toronto.* Kingston.
* " 28. *Warrington.* Glaisher.
* " 29. *Jersey, Clifton.* Glaisher.
" 30. *Jersey.* Glaisher.

1854.

*Jan. 2. *Toronto.* Kingston.
* " 8. *Christiania.* Fearnley.
* " 23. *Toronto.* Kingston.
* " 28. *Toronto.* Kingston.
* " 28. *Christiania.* Fearnley.
Feb. 3. *Toronto.* Kingston.
" 9. *Toronto.* Kingston.
* " 10. *Christiania.* Fearnley.
" 14. *Christiania.* Fearnley.
" 15. *Christiania.* Fearnley.
* " 16. *Toronto.* Kingston.
" 19. *Christiania.* Fearnley.
" 23. *Christiania.* Fearnley.
* " 24. *Christiania.* Fearnley.
* " 25. *Christiania.* Fearnley.
* " 26. *Christiania.* Fearnley.
* " 27. *Toronto.* Kingston.
" 28. *Christiania.* Fearnley.
March 2. *Christiania.* Fearnley.
* " 3. *Toronto.* Kingston.
* " 3. *Christiania.* Fearnley.
" 4. *Toronto.* Kingston.
" 10. *Toronto.* Kingston.
* " 15. *Toronto.* Kingston.
* " 15. *Christiania.* Fearnley.
* " 16. *Toronto.* Kingston.
* " 16. *Christiania.* Fearnley.
* " 20. *Christiania.* Fearnley.
* " 21. *Toronto.* Kingston.
March 22. *Christiania.* Fearnley.
" 25. *Toronto.* Kingston.
" 25. *Christiania.* Fearnley.
" 26. *Toronto.* Kingston.
" 26. *Christiania.* Fearnley.
* " 27. *Toronto.* Kingston.
* " 28. *Toronto.* Kingston.
* " 29. *Toronto.* Kingston.
* " 30. *Toronto.* Kingston.
April 1. *Toronto.* Kingston.
* " 10. *Toronto.* Kingston.
" 11. *Christiania.* Fearnley.
* " 14. *Christiania.* Fearnley.
* " 15. *Christiania.* Fearnley.
" 19. *Toronto.* Kingston.
" 19. *Christiania.* Fearnley.
* " 20. *Toronto.* Kingston.
* " 20. *Christiania.* Fearnley.
* " 21. *Toronto.* Kingston.
* " 21. *Christiania.* Fearnley.
" 22. *Christiania.* Fearnley.
* " 23. *Toronto.* Kingston.
* " 23. *Christiania.* Fearnley.
* " 24. *Christiana.* Fearnley.
" 27. *Toronto.* Kingston.
" 28. *Toronto.* Kingston.
May 10. *Toronto.* Kingston.
* " 15. *Toronto.* Kingston.
* " 19. *Toronto.* Kingston.
" 25. *Toronto.* Kingston.
* " 26. *Toronto.* Kingston.
" 31? *Toronto.* Kingston.
*June 12. *Toronto.* Kingston.
" 23. *Toronto.* Kingston.
*July 3. *Toronto.* Kingston.
* " 10. *Toronto.* Kingston.
" 22. *Toronto.* Kingston.
" 24. *Toronto.* Kingston.
*Aug. 20. *Toronto.* Kingston.
*Sept. 10. *Toronto.* Kingston.
* " 15. *Toronto.* Kingston.
* " 17. *Toronto.* Kingston.
* " 17. *Christiania.* Fearnley.
* " 20. *Christiania.* Fearnley.
* " 21. *Toronto.* Kingston.
* " 21. *Christiania.* Fearnley.
* " 22. *Christiania.* Fearnley.
* " 25. *Christiania.* Fearnley.
* " 26. *Toronto.* Kingston.
* " 26. *Christiania.* Fearnley.

Sept. 27. *Toronto.* Kingston.
Oct. 2. *Toronto.* Kingston.
* " 8. *Christiania.* Fearnley.
" 12. *Toronto.* Kingston.
" 12. *Christiania.* Fearnley.
" 13. *Christiania.* Fearnley.
" 17. *Toronto.* Kingston.
* " 18. *Toronto.* Kingston.
* " 23. *Toronto.* Kingston.
Nov. 8. *Toronto.* Kingston.
" 8. *Christiania.* Fearnley.
* " 20. *Toronto.* Kingston.
*Dec. 29. *Toronto.* Kingston.

1855.

Jan. 11. *Christiania.* Fearnley.
" 12. *Christiania.* Fearnley.
" 24. *Toronto.* Kingston.
Feb. 8. *Christiania.* Fearnley.
" 9. *Toronto.* Kingston.
" 9. *Christiania.* Fearnley.
* " 11. *Toronto.* Kingston.
* " 11. *Christiania.* Fearnley.
* " 12. *Christiania.* Fearnley.
* " 14. *Christiania.* Fearnley.
" 19. *Christiania.* Fearnley.
" 20. *Toronto.* Kingston.
" 21. *Toronto.* Kingston.
March 6. *Toronto.* Kingston.
* " 9. *Toronto.* Kingston.
* " 12. *Toronto.* Kingston.
" 15. *Toronto.* Kingston.
* " 18. *Toronto.* Kingston.
* " 19. *Christiania.* Fearnley.
April 4. *Toronto.* Kingston.
* " 7. *Toronto.* Kingston.
* " 7. *Christiania.* Fearnley.
* " 9. *Toronto.* Kingston.
* " 9. *Christiania.* Fearnley.
" 11. *Toronto.* Kingston.
* " 12. *Toronto.* Kingston.
* " 14. *Toronto.* Kingston.
* " 15. *Toronto.* Kingston.
* " 15. *Christiania.* Fearnley.
" 19. *Christiania.* Fearnley.
* " 20. *Toronto.* Kingston.
" 22. *Toronto.* Kingston.
*May 1. *Toronto.* Kingston.
" 8. *Toronto.* Kingston.
* " 10. *Toronto.* Kingston.
June 8. *Toronto.* Kingston.
" 10. *Toronto.* Kingston.
" 16. *Toronto.* Kingston.
" 22. *Toronto.* Kingston.
July 19. *Toronto.* Kingston.
" 21. *Toronto.* Kingston.
Aug. 4 *Toronto.* Kingston.
" 11. *Toronto.* Kingston.
" 14. *Toronto.* Kingston.
* " 17. *Toronto.* Kingston.
" 18. *Toronto.* Kingston.
* " 23. *Toronto.* Kingston.
*Sept. 10. *Toronto.* Kingston.
* " 11. *Christiania.* Fearnley.
" 15. *Upsal?* Wolf.[1]
* " 17. *Christiania.* Fearnley.
" 27. *Toronto.* Kingston.
*Oct. 3. *Toronto.* Kingston.
* " 4. *Toronto.* Kingston.
" 11. *Toronto.* Kingston.
* " 16. *Toronto.* Kingston. *Upsal?* Wolf.
* " 16. *Christiania.* Fearnley.
* " 18. *Christiania.* Fearnley.
" 19. *Christiania.* Fearnley.
" 28. *Christiania.* Fearnley.
*Nov. 2. *Christiania.* Fearnley.
" 3. *Toronto.* Kingston.
* " 5. *Toronto.* Kingston.
* " 5. *Christiania.* Fearnley.
" 12. *Toronto.* Kingston.
* " 16. *Toronto.* Kingston.
" 18. *Toronto.* Kingston.
* " 29. *Christiania.* Fearnley. Wolf.
Dec. 4. *Toronto.* Kingston.

1856.

*Jan. 31. *Christiania.* Fearnley.
Feb. 11. *Christiania.* Fearnley.
" 13. *Toronto.* Kingston.
" 16. *Toronto.* Kingston.
" 20. *Toronto.* Kingston.
" 23. *Toronto.* Kingston.
" 25. *Toronto.* Kingston.
March 1. *Christiania.* Fearnley.
* " 2. *Toronto.* Kingston.
" 3. *Toronto.* Kingston.
" 5. *Toronto.* Kingston.
" 6. *Toronto.* Kingston.
" 8. *Christiania.* Fearnley.

[1] Nova Acta Upsal., Third Series, Vol. II.

March	18.	*Toronto.*	Kingston.
"	27.	*Christiania.*	Fearnley.
* "	30.	*Toronto.*	Kingston.
* "	31.	*Toronto.*	Kingston.
April	8.	*Toronto.*	Kingston.
* "	22.	*Toronto.*	Kingston.
* "	22.	*Christiania.*	Fearnley.
"	28.	*Toronto.*	Kingston.
	29.	*Toronto.*	Kingston.
June	10.	*Toronto.*	Kingston.
July	7.	*Toronto.*	Kingston.
"	9.	*Toronto.*	Kingston.
"	10.	*Toronto.*	Kingston.
"	12.	*Toronto.*	Kingston.
Aug.	6.	*Toronto.*	Kingston.
* "	22.	*Toronto.*	Kingston.
* "	22.	*Christiania.*	Fearnley.
"	23.	*Toronto.*	Kingston.
"	23.	*Christiania.*	Fearnley.
* "	24.	*Toronto.*	Kingston.
"	30.	*Christiania.*	Fearnley.
* "	31.	*Toronto.*	Kingston.
Sept.	1.	*Christiania.*	Fearnley.
"	8.	*Toronto.*	Kingston.
"	8.	*Christiania.*	Fearnley.
"	9.	*Christiania.*	Fearnley.
"	10.	*Christiania.*	Fearnley.
"	16.	*Toronto.*	Kingston.
"	26.	*Toronto.*	Kingston.
"	26.	*Christiania.*	Fearnley.
*Oct.	4.	*Toronto.*	Kingston.
"	6.	*Christiania.*	Fearnley.
"	8.	*Toronto.*	Kingston.
"	22.	*Christiania.*	Fearnley.
* "	23.	*Toronto.*	Kingston.
* "	23.	*Christiania.*	Fearnley.
Nov.	3.	*Christiania.*	Fearnley.
"	4.	*Toronto.*	Kingston.
"	10.	*Insel Oesel, Russland.*	Rahr. Heis.[1]
"	22.	*Christiania.*	Fearnley.
Dec.	1.	*Christiania.*	Fearnley.
"	4.	*Christiania.*	Fearnley.
"	17.	*Christiania.*	Fearnley.
"	23.	*Toronto.*	Kingston.
"	23.	*Christiania.*	Fearnley.
"	28.	*Insel Oesel.*	Rahr.
* "	29.	*Christiania.*	Fearnley.

[1] Wochenschrift für Astronomie etc. Neue Folge, Jahrgang VIII. p. 175.

1857.

Feb.	26.	*Toronto.*	Kingston.
March	16.	*Toronto.*	Kingston.
"	17.	*Toronto.*	Kingston.
"	17.	*Christiania.*	Fearnley.
"	28.	*Christiania.*	Fearnley.
April	22.	*Toronto.*	Kingston.
May	7.	*Toronto.*	Kingston.
"	8.	*Toronto.*	Kingston.
"	13.	*Toronto.*	Kingston.
June	11.	*Toronto.*	Kingston.
July	11.	*Toronto.*	Kingston.
"	17.	*Toronto.*	Kingston.
"	22.	*Toronto.*	Kingston.
"	25.	*Toronto.*	Kingston.
"	28.	*Toronto.*	Kingston.
Aug.	26.	*Toronto.*	Kingston.
*Sept.	3.	*Toronto*	Kingston.
* "	3.	*Christiania.*	Fearnley.
* "	10.	*Toronto.*	Kingston.
"	14.	*Toronto.*	Kingston.
"	18.	*Christiania.*	Fearnley.
* "	19.	*Christiania.*	Fearnley.
"	21.	*Christiania.*	Fearnley.
"	23.	*Toronto.*	Kingston.
"	23.	*Christiania.*	Fearnley.
"	25.	*Toronto.*	Kingston.
"	29.	*Toronto.*	Kingston.
Oct.	17.	*Toronto.*	Kingston.
"	23.	*Toronto.*	Kingston
* "	24.	*Christiania.*	Fearnley.
*Nov.	9.	*Christiania.*	Fearnley.
* "	10.	*Christiania.*	Fearnley.
* "	11.	*Insel Oesel.*	Rahr.
* "	11.	*Christiania.*	Fearnley.
"	16.	*Insel Oesel.*	Rahr.
"	16.	*Christiania.*	Fearnley.
* "	17.	*Toronto.*	Kingston.
* "	23.	*Toronto.*	Kingston.
*Dec.	17.	*Insel Oesel.*	Rahr.
* "	17.	*Brussels.*	Quetelet. Heis.[1]
* "	17.	*Christiania.*	Fearnley.
* "	20.	*Toronto.*	Kingston.
* "	22.	*Toronto.*	Kingston.
"	23.	*Christiania.*	Fearnley.
"	27.	*Christiania.*	Fearnley.

[1] Wochenschrift für Astronomie etc. Neue Folge, Jahrgang I. 96, &c.

1858.

*Jan. 1. *Christiania.* Fearnley.
" 3. *Toronto.* Kingston.
* " 8. *Toronto.* Kingston.
* " 8. *Insel Oesel.* Rahr. *Dorpat.* Heis.
" 10. *Christiania.* Fearnley.[1]
" 13. *Christiania.* Fearnley.
" 15. *Christiania.* Fearnley.
" 16. *Christiania.* Fearnley.
*Feb. 2. *Christiania.* Fearnley.
" 8. *Christiania.* Fearnley.
* " 10. *Christiania.* Fearnley.
* " 12. *Toronto.* Kingston.
* " 14. *Toronto.* Kingston.
* " 14. *Christiania.* Fearnley.
* " 15. *Toronto.* Kingston.
* " 15. *Christiania.* Fearnley.
* " 16. *Toronto.* Kingston. *Insel Oesel.* Rahr.
* " 16. *Christiania.* Fearnley.
* " 17. *Toronto.* Kingston.
* " 17. *Christiania.* Fearnley.
* " 18. *Toronto.* Kingston.
*March 1. *Insel Oesel.* Rahr.
* " 1. *Christiania.* Fearnley.
* " 2. *Toronto.* Kingston.
* " 12. *Toronto.* Kingston.
* " 13. *Insel Oesel.* Rahr.
* " 14. *Insel Oesel.* Rahr.
* " 15. *Christiania.* Fearnley.
* " 17. *Toronto.* Kingston.
* " 17. *Christiania.* Fearnley.
* " 18. *Toronto.* Kingston.
*April 1. *Rose Hill, Engl.* Glaisher.
" 4. *Christiania.* Fearnley.
* " 9. *Toronto.* Kingston. *Insel Oesel.* Rahr.
* " 9. *Many places in England.* Glaisher.
* " 9. *Skive, North Jutland, Dresden.* Heis.
* " 9. *Gottingen, Naugard.* Heis.
* " 9. *Christiania.* Fearnley. *Munster.* Heis.
* " 10. *Toronto.* Kingston.
* " 10. *Many places in England.* Glaisher.
* " 10. *Christiania.* Fearnley.
* " 11. *Clifton.* Glaisher. *Insel Oesel.* Rahr.
* " 12. *Silloth.* Glaisher. *Christiania.* Fearnley.
* " 14. *Toronto.* Kingston.
* " 14. *Christiania.* Fearnley.
* " 15. *Toronto.* Kingston.

[1] Light over the firmament. Doubtful whether it was an aurora.

April 21. *Paris.* Raillard. Heis.
" 24. *Fairlight, Engl.* Glaisher.
" 29. *Clifton, Engl.* Glaisher.
May 1. *Toronto.* Kingston. *Insel Oesel.* Rahr.
" 2. *Clifton, Engl.* Glaisher.
" 6. *Clifton, Engl.* Glaisher.
* " 7. *Toronto.* Kingston.
* " 7. *Clifton, Oxford, Engl.* Glaisher.
* " 8. *Toronto.* Kingston. *Clifton.* Glaisher.
" 9. *Toronto.* Kingston.
" 10. *Clifton, Engl.* Glaisher.
" 21. *Toronto.* Kingston.
June 3. *Toronto.* Kingston.
" 6. *Oxford, Engl.* Glaisher.
" 7. *Toronto.* Kingston.
" 18. *Toronto.* Kingston.
" 23. *Toronto.* Kingston.
July 4. *Toronto.* Kingston.
* " 5. *Toronto.* Kingston.
" 6. *Toronto.* Kingston.
" 12. *Toronto.* Kingston.
" 15. *Toronto.* Kingston.
Aug. 13. *Toronto.* Kingston.
" 15. *Toronto.* Kingston.
" 16. *Toronto.* Kingston.
* " 21. *Christiania.* Fearnley. Heis.
" 25. *Toronto.* Kingston.
" 25. *Christiania.* Fearnley.
* " 30. *Toronto.* Kingston.
* " 31. *Toronto.* Kingston.
*Sept. 1. *Toronto.* Kingston.
* " 7. *Toronto.* Kingston.
* " 8. *Toronto.* Kingston.
" 10. *Toronto.* Kingston.
* " 12. *Toronto.* Kingston.
" 13. *Toronto.* Kingston.
" 13. *Christiania.* Fearnley. Heis.
" 20. *Toronto.* Kingston.
" 20. *Christiania.* Fearnley. Heis.
" 21. *Christiania.* Fearnley. Heis.
" 22. *Toronto.* Kingston.
" 24. *Christiania.* Fearnley. Heis.
Oct. 1. *Toronto.* Kingston.
* " 2. *Toronto.* Kingston.
* " 2. *Christiania.* Fearnley. Heis.
* " 4. *Toronto.* Kingston.
" 5. *Toronto.* Kingston.
* " 6. *Christiania.* Fearnley. Heis.
* " 8. *Christiania.* Fearnley. Heis.
* " 9. *Toronto.* Kingston.

*Oct. 9. *Christiania.* Fearnley. Heis.
* " 10. *Toronto.* Kingston.
" 13. *Christiania.* Fearnley. Heis.
" 18. *Toronto.* Kingston.
" 18. *Christiania.* Fearnley.
" 19. *Christiania.* Fearnley. Heis.
" 26. *Toronto.* Kingston.
* " 27. *Toronto.* Kingston.
* " 29. *Christiania.* Fearnley. Heis.
* " 30. *Toronto.* Kingston.
*Nov. 7. *Toronto.* Kingston.
" 10. *Toronto.* Kingston.
" 10. *Christiania.* Fearnley. Heis.
" 13. *Christiania.* Fearnley. Heis.
" 15. *Toronto.* Kingston.
" 19. *Christiania.* Fearnley. Heis.
*Dec. 4. *Gaesdonck bei Goch.* Heis.[1]
* " 4. *Munster, Jung-Bunzlau, Bohemia.* Heis.
" 22. *Toronto.* Kingston.
* " 24. *Toronto.* Kingston. *Christiania.* Fearnley.
" 29. *Christiania.* Fearnley.

1859.

*Jan. 1. *Havre.* Heis.[2]
* " 9. *Isle Jesus.* Smallwood.
* " 10. *Isle Jesus.* Smallwood.
* " 11. *Isle Jesus.* Smallwood.
* " 11. *Christiania.* Fearnley.
" 15. *Christiania.* Fearnley.
" 22. *Helston, Engl.* Glaisher.
" 23. *Rose Hill, Engl.* Glaisher.
* " 28. *Christiania.* Fearnley.
*Feb. 1. *Isle Jesus.* Smallwood.
" 6. *Isle Jesus.* Smallwood.
* " 9. *Toronto.* Kingston.
* " 9. *Many places in England.* Glaisher.
* " 22. *Isle Jesus.* Smallwood.
* " 22. *Many places in England.* Glaisher.
* " 22. *Christiania.* Fearnley.
* " 23. *Christiania.* Fearnley.
* " 23. *Rendsburg, Hamburg.* Heis.
* " 23. *Naugard, Prague.* Heis.
* " 23. *Copenhagen.* D'Arrest. *Dorpat.* Ballot.[3]

[1] Wochenschrift für Astronomie etc. Neue Folge, Jahrgang II. 30, &c.

[2] Havre was put into painful agitation on New Year's evening by the cry of fire. The heavens glowed with a fiery red color. The whole fire department turned out and found fortunately nothing to extinguish but an aurora. — *Wochenschrift für Astronomie, II.* 40.

[3] Nederlandsch Meteorologisch Jaarboek, 1859, p. 338.

*Feb. 23. *Many places in England.* Glaisher.
* " 24. *Toronto.* Kingston.
* " 24. *Isle Jesus.* Smallwood.
* " 24. *Christiania.* Fearnley.
* " 24. *Many places in England.* Glaisher.
* " 24. *Dorpat.* Mädler. Ballot. Heis.
" 25. *Isle Jesus.* Smallwood.
" 25. *Nottingham, Stonyhurst, Engl.* Glaisher.
" 25. *Dorpat.* Mädler. Ballot. Heis.
* " 26. *Clifton, Manchester, Engl.* Glaisher.
* " 26. *Dorpat.* Mädler. Ballot. Heis.
" 27. *Christiania.* Fearnley.
" 28. *Toronto.* Kingston.
March 1. *Toronto.* Kingston.
" 1. *Isle Jesus.* Smallwood.
* " 2. *Isle Jesus.* Smallwood.
* " 2. *Rose Hill, Engl.* Glaisher.
" 3. *Christiania.* Fearnley.
* " 5. *Christiania.* Fearnley.
" 8. *Isle Jesus.* Smallwood.
" 16. *Toronto.* Kingston.
" 21. *Isle Jesus.* Smallwood.
" 23. *Toronto.* Kingston.
" 24. *Toronto.* Kingston.
" 24. *Christiania.* Fearnley.
" 25. *St. Paul's Parsonage, Engl.* Glaisher.
" 25. *Christiania.* Fearnley.
* " 26. *Toronto.* Kingston.
* " 26. *Christiania.* Fearnley.
* " 26. *Many places in England.* Glaisher.
" 27. *Isle Jesus.* Smallwood.
" 27. *Nottingham, Hawarden, Engl.* Glaisher.
" 29. *Toronto.* Kingston.
" 29. *Hawarden, Engl.* Glaisher.
* " 30. *Toronto.* Kingston.
* " 30. *Isle Jesus.* Smallwood.
* " 30. *Many places in England.* Glaisher.
* " 30. *Christiania.* Fearnley.
" 31. *Toronto.* Kingston.
" 31. *Isle Jesus.* Smallwood.
" 31. *St. Paul's Parsonage, Engl.* Glaisher.
" 31. *Christiania.* Fearnley.
April 1. *Isle Jesus.* Smallwood.
" 1. *England.* Glaisher.
* " 2. *Isle Jesus.* Smallwood.
" 5. *Christiania.* Fearnley.
* " 6. *Isle Jesus.* Smallwood.
" 7. *Toronto.* Kingston.
" 8. *Toronto.* Kingston.
" 8. *Isle Jesus.* Smallwood

April 9. *Isle Jesus.* Smallwood.
* " 12. *Toronto.* Kingston.
" 14. *Christiania.* Fearnley.
* " 21. *Toronto.* Kingston. *Isle Jesus.* Smallwood.
* " 21. *Strehla, Kremsmünster.* Heis.
* " 21. *Christiania.* Fearnley.
* " 21. *England.* Glaisher.
* " 21. *Munich.* Lamont. Ballot.
* " 21. *Prague, Leipsic.* Heis.
* " 22. *Christiania.* Fearnley. *Munster.* Heis.
* " 22. *England.* Glaisher.
" 23. *Toronto.* Kingston.
" 23. *Christiania.* Fearnley. *Munster.* Heis.
* " 24. *Christiania.* Fearnley.
" 25. *Christiania.* Fearnley.
* " 28. *Toronto.* Kingston. *England.* Glaisher.
* " 29. *Toronto.* Kingston. *Isle Jesus.* Smallwood.
* " 29. *Kremsmünster.* Heis. Ballot.
May 1. *England.* Glaisher.
" 2. *Isle Jesus.* Smallwood.
" 5. *England.* Glaisher.
" 10. *Toronto.* Kingston.
" 19. *Isle Jesus.* Smallwood.
" 20. *Toronto.* Kingston.
" 22. *Toronto.* Kingston.
" 24. *Toronto.* Kingston.
June 8. *Toronto.* Kingston.
" 15. *Toronto.* Kingston.
" 25. *Toronto.* Kingston.
July 11. *Toronto.* Kingston.
" 11. *Isle Jesas.* Smallwood.
" 15. *Wemlinghoven, Rheinprovince.* Heis.
" 23. *Toronto.* Kingston.
* " 28. *Toronto.* Kingston.
" 29. *Toronto.* Kingston.
" 29. *Isle Jesus.* Smallwood.
Aug. 19. *Toronto.* Kingston.
" 19. *Isle Jesus.* Smallwood.
* " 21. *Toronto.* Kingston.
" 23. *Isle Jesus.* Smallwood.
* " 28. *Toronto.* Kingston. *Isle Jesus.* Smallwood.
* " 28. *At Sea, Lat.* 30°. *Long.* 45°. Fitz Roy.[1]
* " 28. *At Sea, Lat.* 26°. *Long.* 46°. Fitz Roy.
* " 28. *At Sea, Lat.* 51°. *Long.* 10°. Fitz Roy.
* " 28. *Australia.* Glaisher.
* " 28. *Christiania.* Fearnley.
* " 28. *Rafz.* Heer. *Holland.*[2]

[1] Amer. Journ. Sci. New Series, XXXII and 78.
[2] Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, II. 297, 301, 340, 385. III. 127. IV. 390.

*Aug. 28. *Belgium, France, Italy.* Heis.
* " 28. *Leipsic, Munich.* Ballot. Heis.
* " 29. *Isle Jesus.* Smallwood.
* " 29. *Toronto.* Kingston. *Rome, Prague.* Heis.
* " 29. *Australia.* Glaisher.
* " 29. *Brussels.* Ballot. Heis.
* " 30. *Grantham, Engl. Vischel?* Heis.
" 31. *Grantham, Engl. Vischel.* Heis.
*Sept. 1. *Toronto.* Kingston. *Grantham.* Heis.
* " 1. *Cracow.* Ballot. *Christiania.* Hansteen.
* " 2. *Toronto.* Kingston. *Isle Jesus.* Smallwood.
* " 2. *Christiania.* Fearnley.
* " 2. *Clifton, Durham, Kremsmünster.* Heis.[1]
* " 2. *Cracow.* Ballot. Heis.
* " 2. *At Sea, Lat.* 34°. *Long.* 44°. Fitz Roy.
* " 2. *At Sea, Lat.* 34°. *Long.* 33°. Fitz Roy.
* " 2. *At Sea, Lat.* 24°. *Long.* 36°. Fitz Roy.
* " 3. *Toronto.* Kingston.
* " 3. *Christiania.* Fearnley.
* " 3. *Hamburg, Kremsmünster.* Heis.
* " 3. *Clifton, Durham, Engl.* Heis.
* " 3. *Cracow, Dorpat, Stockholm.* Ballot.
* " 4. *Toronto.* Kingston. *Christiania.* Fearnley.
* " 4. *Clifton, Tottenham, Grantham, Durham.*
* " 4. *Gottenburg, Neumark.* Heis.
* " 5. *Toronto.* Kingston. *Christiania.* Fearnley.
* " 5. *St. Petersburg, Hanem.* Heis.
" 6. *Christiania.* Fearnley. *Stockholm.* Heis.
" 6. *Hamburg, Munster, Naugard.* Heis.
" 14. *Toronto.* Kingston. *Isle Jesus.* Smallwood.
" 18. *Isle Jesus.* Smallwood.
" 20. *Isle Jesus.* Smallwood.
* " 24. *England, Holland.* Heis.
* " 24. *Cologne, Hamburg, Clement.* Heis.
* " 24. *Kremsmunster.* Ballot.
* " 24. *Hülsber Crefeld.* Becket. Heis.
* " 25. *Elberfeld.* Heis.
" 26. *Christiania.* Fearnley.
* " 27. *Toronto.* Kingston.
* " 27. *Christiania.* Fearnley. *Hamburg.* Clement.
" 28. *Toronto.* Kingston.
" 29. *Isle Jesus.* Smallwood.
*Oct. 1. *Dorpat.* Ballot. *Munich.* Lamont.
* " 1. *Gaesdonck, Hamburg.* Heis.
* " 1. *Christiania.* Fearnley. *Paris.* Goldsmith.
* " 1. *Kremsmünster.* Reslhuber. Coesfeld. Heis.
* " 1. *Naugard.* Winkler. *Frier.* Heis.
* " 1. *Lymington, Hants.* Campbell. Heis.

[1] Wochenschrift für Astronomie etc., Neue Folge, Jahrgang III. 16 &c.

*Oct. 2. *Toronto.* Kingston. *Isle Jesus.* Smallwood.
* " 2. *Toulouse, Cassel, Madrid.* Heis.
* " 3. *Toronto.* Kingston.
" 6. *Christiania.* Fearnley.
* " 12. *Cracow, Leipsic, Putbus.* Ballot.
* " 12. *Christiania?* Hansteen. *Dresden.* Groth.
* " 12. *Hervest.* Eming. *Lichtenberg.* Bornitz.
* " 12. *Naugard.* Klopsch. *Rome.* Heis.
* " 17. *Christiania.* Fearnley.
* " 18. *Toronto.* Kingston. *Isle Jesus.* Smallwood.
* " 18. *Christiania.* Fearnley.
* " 18. *Haparanda.* Ballot.
* " 19. *Isle Jesus.* Smallwood.
* " 19. *Dorpat.* Heis. *Paris.* Ballot.
* " 20. *Toronto.* Kingston.
* " 20. *Christiania.* Fearnley.
* " 21. *Toronto.* Kingston. *Christiania.* Fearnley.
* " 22. *Isle Jesus.* Smallwood.
* " 22. *Christiania.* Fearnley.
" 23. *Christiania.* Fearnley.
" 24. *Peckeloh.* Weber. Heis.
" 27. *Christiania.* Fearnley.
" 31. *Christiania.* Fearnley.
Nov. 5. *Toronto.* Kingston.
" 12. *Christiania.* Fearnley. *Dorpat.* Ballot.
* " 13. *Toronto.* Kingston.
" 15. *Christiania.* Fearnley.
" 16. *Haparanda.* Ballot.
* " 24. *Christiania.* Fearnley.
" 29. *Christiania.* Fearnley.
Dec. 6. *Haparanda, Rome.* Ballot.[1]
* " 13. *Toronto.* Kingston. *Naugard.* Heis.
* " 13. *Christiania.* Fearnley.
* " 13. *Haparanda.* Ballot.
* " 14. *Toronto.* Kingston.
* " 14. *Christiania.* Fearnley.
* " 15. *Toronto.* Kingston
* " 16. *Christiania.* Fearnley.
" 22. *Isle Jesus.* Smallwood.
" 22. *Gresten, Austria.* Heis.
* " 23. *Toronto.* Kingston.
* " 26. *Isle Jesus.* Smallwood.
" 28. *Isle Jesus.* Smallwood.
* " 30. *Toronto.* Kingston.

1860.

Jan. 11. *Toronto.* Kingston.
" 13. *Haparanda.* Ballot.
" 16. *Christiania.* Fearnley.

[1] Nederlandsch Meteorologisch Jaarboek, 1860, p. 302.

*Jan. 20. *Isle Jesus.* Smallwood.
* " 20. *Toronto.* Kingston.
* " 20. *Haparanda.* Ballot. Heis.
* " 21. *Toronto.* Kingston.
" 26. *Christiania.* Fearnley.
" 27. *Toronto.* Kingston.
" 28. *Toronto.* Kingston.
*Feb. 10. *Christiania.* Fearnley. *Stockholm.* Ballot.
* " 11. *Stockholm.* Ballot.
* " 12. *Christiania.* Fearnley. *Nottingham.* Ballot.
" 16. *Toronto.* Kingston. *Stockholm.* Ballot.
* " 17. *Isle Jesus.* Smallwood.
* " 17. *Haparanda, Stockholm.* Ballot.
" 19. *Isle Jesus.* Smallwood.
" 19. *Haparanda.* Ballot.
" 20. *Haparanda.* Ballot.
* " 21. *Isle Jesus.* Smallwood.
* " 21. *Toronto.* Kingston.
* " 21. *Haparanda.* Ballot. Heis.
* " 21. *Christiania.* Fearnley.
* " 22. *Isle Jesus.* Smallwood. *Dorpat.* Ballot.
*March 12. *Toronto.* Kingston.
* " 12. *Isle Jesus.* Smallwood.
* " 12. *Christiania.* Fearnley.
* " 12. *Nottingham.* Ballot.
* " 13. *Isle Jesus.* Smallwood.
* " 13. *Toronto.* Kingston.
* " 13. *Christiania.* Fearnley.
* " 14. *Toronto.* Kingston.
* " 14. *Isle Jesus.* Smallwood.
" 15. *Toronto.* Kingston.
* " 16. *Isle Jesus.* Smallwood.
* " 16. *Toronto.* Kingston. *Haparanda.* Ballot.
* " 17. *Isle Jesus.* Smallwood.
* " 17. *Toronto.* Kingston.
* " 17. *St. Petersburg.* Ballot.
* " 18. *Isle Jesus.* Smallwood.
* " 18. *Christiania.* Fearnley. *Stockholm.* Ballot.
* " 18. *St. Petersburg, Nottingham.* Ballot.
* " 19. *Toronto.* Kingston.
* " 19. *Isle Jesus.* Smallwood.
" 21. *Toronto.* Kingston.
" 22. *Christiania.* Fearnley. *Nottingham.* Ballot.
" 23. *Toronto.* Kingston.
" 23. *Isle Jesus.* Smallwood.
* " 24. *Christiania?* Ballot.
" 25. *Cuba.* Poey. Heis.
" 25. *Nottingham.* Ballot.
* " 26. *Toronto.* Kingston. *Dresden.* Fischer.
* " 26. *Christiania.* Fearnley.

*March	27.	*Toronto.* Kingston. *Sweden.* Heis.[1]
* "	28.	*Brussels.* Quetelet. Heis.
* "	29.	*Christiania.* Fearnley.
April	8.	*Christiania.* Hansteen.
* "	9.	*Toronto.* Kingston.
* "	9.	*Isle Jesus.* Smallwood.
* "	9.	*Christiania.* Fearnley. *Crefeld.* Heis.
* "	9.	*Skive, North Jutland, Munster.* Heis.
* "	9.	*Wiedenbruck.* Heising. Heis.
* "	9.	*Nottingham.* Ballot. *Galditz.* Heis.
* "	9.	*Hamburg.* Hamm. Heis.
"	10.	*Christiania.* Fearnley.
"	11.	*Toronto.* Kingston.
"	11.	*Christiania.* Fearnley.
* "	12.	*Toronto.* Kingston.
* "	13.	*Isle Jesus.* Smallwood. *Werden.* Heis.
* "	14.	*Toronto.* Kingston.
* "	14.	*Isle Jesus.* Smallwood.
"	16.	*Christiania.* Fearnley.
"	16.	*Nottingham.* Ballot. *Munster.* Heis.
* "	18.	*Toronto.* Kingston.
* "	18.	*Isle Jesus.* Smallwood.
* "	18.	*Christiania.* Fearnley.
"	19.	*Christiania.* Fearnley.
"	23.	*Toronto.* Kingston.
"	26.	*Toronto.* Kingston.
May	11.	*Toronto.* Kingston.
"	12.	*Toronto.* Kingston.
"	12.	*Isle Jesus.* Smallwood.
"	14.	*Toronto.* Kingston.
"	18.	*Toronto.* Kingston.
"	23.	*Toronto.* Kingston.
"	24.	*Toronto.* Kingston.
"	27.	*Toronto.* Kingston.
June	9.	*Toronto.* Kingston.
"	10.	*Toronto.* Kingston.
* "	30.	*Near Cape Chudleigh.* Venable.[2]
July	1.	*Near Cape Chudleigh.* Venable.
"	2.	*Near Cape Chudleigh.* Venable.
* "	4.	*Near Cape Chudleigh.* Venable.
"	8.	*Near Cape Chudleigh.* Venable.
"	11.	*Toronto.* Kingston.
"	11.	*Near Cape Chudleigh.* Venable.
"	12.	*Toronto.* Kingston.
"	12.	*Near Cape Chudleigh.* Venable.
"	16.	*Near Cape Chudleigh.* Venable.

[1] Wochenschrift für Astronomie etc. Neue Folge, Jahrgang IV. 98, &c.

[2] In Labrador. See U. S. Coast Survey Reports, 1860, pp. 258, 9.

*July	17.	*Toronto.* Kingston.
* "	17.	*Near Cape Chudleigh.* Venable.
"	18.	*Isle Jesus.* Smallwood.
* "	19.	*Toronto.* Kingston.
* "	19.	*Isle Jesus.* Smallwood.
"	21.	*Toronto.* Kingston.
"	23.	*Isle Jesus.* Smallwood.
"	25.	*Near Cape Chudleigh.* Venable.
"	27.	*Toronto.* Kingston.
"	29.	*Near Cape Chudleigh.* Venable.
Aug.	1.	*Near Cape Chudleigh.* Venable.
"	2.	*Near Cape Chudleigh.* Venable.
"	4.	*Isle Jesus.* Smallwood.
"	5.	*Isle Jesus.* Smallwood.
* "	6.	*Toronto.* Kingston.
* "	6.	*Near Cape Chudleigh.* Venable.
* "	8.	*Toronto.* Kingston.
* "	8.	*Isle Jesus.* Smallwood.
* "	8.	*Prague, Dresden, Braunsberg.* Heis.
* "	9.	*Toronto.* Kingston.
* "	9.	*Isle Jesus.* Smallwood.
* "	9.	*Kremsmünster.* Ballot. Heis.
* "	10.	*Toronto.* Kingston. *Dresden.* Fischer.
* "	10.	*St. Petersburg, Emden.* Ballot. Heis.
* "	11.	*Toronto.* Kingston.
* "	11.	*Isle Jesus.* Smallwood.
* "	12.	*Isle Jesus.* Smallwood.
* "	12.	*Weenen, Kremsmünster.* Ballot. Heis.
* "	12.	*Orenbourg.* Anitschkoff.
* "	13.	*Toronto.* Kingston.
* "	13.	*Christiania.* Fearnley.
"	15.	*Christiania.* Fearnley.
* "	16.	*Isle Jesus.* Smallwood.
* "	16.	*Stockholm.* Ballot.
* "	16.	*Christiania.* Fearnley.
* "	18.	*Toronto.* Kingston. *Stockholm.* Ballot.
* "	18.	*Isle Jesus.* Smallwood.
"	19.	*Christiania.* Fearnley.
"	21.	*Isle Jesus.* Smallwood.
* "	22.	*Toronto.* Kingston.
* "	22.	*Isle Jesus.* Smallwood.
*Sept.	6.	*Toronto.* Kingston.
* "	6.	*Isle Jesus.* Smallwood.
* "	6.	*Christiania.* Fearnley.
* "	7.	*Christiania.* Fearnley.
* "	8.	*Toronto.* Kingston.
* "	8.	*Christiania.* Fearnley.
* "	10.	*Toronto.* Kingston.
* "	10.	*Isle Jesus.* Smallwood.
* "	10.	*Christiania.* Fearnley.

Sept. 11. *Christiania.* Fearnley.
* " 15. *Toronto.* Kingston.
* " 15. *Isle Jesus.* Smallwood.
* " 16. *Isle Jesus.* Smallwood. *Moscow.* Ballot.
* " 16. *Christiania.* Fearnley.
* " 17. *Isle Jesus.* Smallwood.
" 19. *Toronto.* Kingston.
* " 25. *Toronto.* Kingston.
Oct. 4 *Christiania.* Fearnley.
" 4. *Stockholm.* Ballot.
* " 8. *Isle Jesus.* Smallwood.
* " 11. *Isle Jesus.* Smallwood.
" 12. *Isle Jesus.* Smallwood.
" 13. *Isle Jesus.* Smallwood.
" 15. *Haparanda.* Ballot.
" 16. *Christiania.* Fearnley.
" 17. *Christiania.* Fearnley.
" 19. *Putbus.* Brehmer. Ballot.
Nov. 2. *Nottingham.* Ballot.
* " 4. *Toronto.* Kingston.
* " 4. *Isle Jesus.* Smallwood.
" 7. *Christiania.* Fearnley.
*Dec. 9. *Isle Jesus.* Smallwood.
* " 10. *Toronto.* Kingston.
* " 10. *Christiania.* Fearnley.
* " 15. *Toronto.* Kingston.
" 16. *Christiania.* Hansteen.
" 21. *Christiania.* Fearnley.
" 24. *Christiania.* Fearnley.
" 25. *Christiania.* Hansteen.

1861.

Jan. 4. *Christiania.* Fearnley.
" 4. *Isle Jesus.* Smallwood.
" 6. *Aalesund.* Fearnley.[1]
" 6. *Christiania.* Fearnley.
" 10. *Isle Jesus.* Smallwood.
* " 22. *Dorpat.* Heis. Ballot.
" 23. *Dorpat.* Heis. Ballot.
" 24. *Munster.* Ballot. Heis.
" 24. *Peckeloh, Elberfeld.* Heis.
Feb. 1. *Christiania?* Hansteen.
" 6. *Aalesund.* Fearnley.
" 8. *Aalesund.* Fearnley.
" 10. *Toronto.* Kingston.
" 10. *Christiania.* Fearnley.
" 11. *Christiania.* Fearnley.
" 11. *Aalesund.* Fearnley.

[1] Meteorologiske Iagttagalser paa Fem Telegrafstationer ved Norges Kyst, p. 2.

*Feb. 12. *Isle Jesus.* Smallwood.
* " 27. *Toronto.* Kingston. *Isle Jesus.* Smallwood.
* " 27. *Christiania.* Fearnley.
* " 28. *Toronto.* Kingston. *Aalesund.* Fearnley.
*March 1. *Isle Jesus.* Smallwood.
* " 1. *Aalesund.* Fearnley.
" 2. *Christiania.* Fearnley.
* " 9. *Toronto.* Kingston.
* " 9. *Copenhagen, Montpellier.* Ballot.
* " 9. *Putbus.* Heis.
* " 9. *Netherlands.* Ballot.[1]
* " 9. *Aalesund, Mandal.* Fearnley.
* " 9. *Christiania, Sandösund.* Fearnley.
* " 9. *Peckeloh.* Weber. Heis.
* " 13. *Toronto.* Kingston. *Isle Jesus.* Smallwood.
* " 13. *Aalesund.* Fearnley.
* " 14. *Toronto.* Kingston.
* " 14. *Isle Jesus.* Smallwood.
* " 14. *Aalesund.* Fearnley.
" 15. *Toronto.* Kingston.
" 15. *Isle Jesus.* Smallwood.
* " 17. *Aalesund.* Fearnley.
* " 17. *Christiania.* Fearnley.
* " 19. *Toronto.* Kingston.
* " 25. *Aalesund, Christiania.* Fearnley.
* " 28. *Isle Jesus.* Smallwood.
" 30. *Toronto.* Kingston.
" 30. *Isle Jesus.* Smallwood.
April 2. *Toronto.* Kingston.
" 4. *Toronto.* Kingston.
" 5. *Isle Jesus.* Smallwood.
* " 7. *Christiania.* Fearnley.
* " 7. *Netherlands.* Ballot.
" 8. *Toronto* Kingston.
" 8. *Isle Jesus.* Smallwood.
" 8. *Christiania.* Fearnley.
" 9. *Toronto.* Kingston.
" 9. *Isle Jesus.* Smallwood.
" 10. *Isle Jesus.* Smallwood.
" 10. *Christiania.* Fearnley.
* " 11. *Isle Jesus.* Smallwood.
* " 11. *Christiania.* Fearnley.
* " 15. *Toronto.* Kingston.
* " 15. *Isle Jesus.* Smallwood.
* " 15. *Munster.* Heis. *Netherlands.* Ballot.
" 16. *Haparanda.* Ballot.
" 19. *Christiania.* Fearnley.
" 22. *Christiania.* Fearnley.

[1] Nederlandsch Meteorologisch Jaarboek, 1861, pp. 284, 285.

April 25. *Prague.* Ballot.
" 26. *Prague.* Ballot.
" 28. *Prague.* Ballot.
" 29. *Prague.* Ballot.
May 4. *Toronto.* Kingston.
" 8. *Toronto.* Kingston.
" 15. *Toronto.* Kingston.
" 16. *Toronto.* Kingston.
" 17. *Toronto.* Kingston.
*June 12. *Toronto.* Kingston.
" 13. *Toronto.* Kingston.
" 29. *Isle Jesus.* Smallwood.
July 9. *Toronto.* Kingston.
" 12. *Isle Jesus.* Smallwood.
" 13. *Isle Jesus.* Smallwood.
" 25. *Isle Jesus.* Smallwood.
*Aug. 1. *Toronto.* Kingston.
* " 1. *Isle Jesus.* Smallwood.
" 2. *Toronto.* Kingston.
" 8. *Isle Jesus.* Smallwood.
" 11. *Isle Jesus.* Smallwood.
" 13. *Isle Jesus.* Smallwood.
" 14. *Toronto.* Kingston.
* " 22. *Toronto.* Kingston.
Sept. 1. *Isle Jesus.* Smallwood.
" 1. *Christiania.* Fearnley.
" 2. *Toronto.* Kingston.
" 4. *Toronto.* Kingston.
" 4. *Isle Jesus.* Smallwood.
" 5. *Toronto.* Kingston.
" 5. *Christiania.* Fearnley.
* " 8. *Isle Jesus.* Smallwood.
* " 8. *Christiania.* Fearnley.
" 10. *Dorpat.* Ballot.
" 11. *Munster.* Ballot.
* " 15. *Toronto.* Kingston.
* " 15. *Isle Jesus.* Smallwood.
" 24. *Isle Jesus.* Smallwood.
" 25. *Netherlands.* Ballot.
" 30. *Haparanda.* Ballot. Heis.[1]
Oct. 2. *Utrecht.* Heis.
" 6. *Christiania.* Fearnley.
* " 10. *Toronto.* Kingston.
* " 10. *Isle Jesus.* Smallwood.
* " 10. *Christiania.* Fearnley. *Dorpat.* Heis.
* " 10. *St. Petersburg, Stockholm.* Ballot. Heis.
* " 10. *Utrecht, Netherlands.* Ballot. Heis.
* " 10. *Sandösund.* Fearnley.

[1] Wochenschrift für Astronomie etc., Neue Folge, Jahrgang V. 37 &c.

Oct. 11. *Haparanda.* Ballot. Heis.
" 13. *Toronto.* Kingston.
" 14. *Toronto.* Kingston.
* " 24. *Toronto.* Kingston.
* " 24. *Isle Jesus.* Smallwood.
* " 25. *Toronto.* Kingston.
* " 27. *Toronto.* Kingston.
* " 27. *Christiania.* Fearnley.
" 28. *Isle Jesus.* Smallwood. *Haparanda.*
" 28. *Haparanda.* Ballot. Heis.
" 31. *Isle Jesus.* Smallwood.
*Nov. 7. *Toronto.* Kingston. *Aalesund.* Fearnley.
* " 7. *Ebstorf, Netherlands.* Ballot. Heis.
" 8. *Isle Jesus.* Smallwood.
" 8. *Christiania.* Fearnley.
" 12. *Aalesund.* Fearnley.
" 20. *Isle Jesus.* Smallwood.
" 23. *Christiania.* Fearnley.
" 26. *Christiania.* Fearnley.
" 30. *Christiania.* Fearnley.
*Dec. 1? *Toronto.* Kingston. *Stockholm.* Heis.
" 2. *Dessau, Prague.* Heis.
" 3. *Dorpat.* Ballot.[1]
" 3? *Stockholm, Peckeloh.* Heis.
* " 4. *Toronto.* Kingston. *Gaesdonck.* Heis.
* " 4. *Netherlands.* Ballot. *Carrow.* Heis.
" 6. *Aalesund.* Fearnley.
" 7. *Aalesund.* Fearnley.
" 12. *Isle Jesus.* Smallwood.
" 14. *Isle Jesus.* Smallwood.
* " 19. *Stockholm, Haparanda.* Ballot. Heis.
* " 19. *Aalesund.* Fearnley.
* " 19. *Mandal, Sandösund.* Fearnley.
" 20. *Toronto.* Kingston.
" 20. *Isle Jesus.* Smallwood.
" 20. *Christiania?* Fearnley. *Basle.* Heis.
" 21. *Toronto.* Kingston.
" 23. *Dresden.* Heis.
" 24. *Dresden.* Heis.
" 26. *Peckeloh.* Weber. Heis.
" 30. *Aalesund.* Fearnley.

1862.

*Jan. 1. *Toronto.* Kingston.
* " 1. *Stockholm.* Heis. Ballot.
* " 2. *Toronto.* Kingston.
* " 2. *Isle Jesus.* Smallwood.
" 5. *Aalesund.* Fearnley.
" 6. *Toronto.* Kingston.

[1] Nederlandsch Meteorologisch Jaarboek, 1862, pp. 296, 319.

Jan. 13. *Isle Jesus.* Smallwood.
" 22. *Aalesund.* Fearnley.
" 24. *Isle Jesus.* Smallwood.
" 29. *Toronto.* Kingston.
* " 31. *Haparanda?* Heis. *Aalesund.* Fearnley.
*Feb. 2. *Aalesund.* Fearnley.
" 6. *Aalesund.* Fearnley.
" 20. *Isle Jesus.* Smallwood.
" 21. *Münster, Peckeloh, Gaesdonck.* Heis.
" 21. *Aalesund.* Fearnley. *Skudesnes.*
" 21. *Netherlands.* Ballot.
" 22. *Athens.* Schmidt. Heis.
" 24. *Aalesund.* Fearnley.
" 24. *Skudesnes, Sandösund.* Fearnley.
* " 28. *Toronto.* Kingston. *Netherlands.* Ballot.
March 4. *Munster.* Heis.
" 5. *Peckeloh.* Weber.[1]
" 14. *Athens.* Schmidt. Heis.
" 19. *Isle Jesus.* Smallwood.
" 25. *Toronto.* Kingston.
" 26. *Isle Jesus.* Smallwood.
" 27. *Toronto.* Kingston.
April 1. *Toronto.* Kingston.
" 2. *Peckeloh.* Weber. Heis.
" 3. *Toronto.* Kingston.
" 10. *Toronto.* Kingston.
" 13. *Paris.* Heis.
" 15. *Toronto.* Kingston. *Isle Jesus.* Smallwood.
" 29. *Toronto.* Kingston.
May 2. *Milan.* Schiaparelli.
" 6. *Isle Jesus.* Smallwood.
" 6. *Toronto.* Kingston.
" 19. *Munster.* Heis. *Wilna.* Gussew. Heis.
" 19. *Milan.* Schiaparelli.
" 20. *Milan.* Schiaparelli.
" 21. *Toronto.* Kingston.
" 23. *Toronto.* Kingston.
" 30. *Toronto.* Kingston.
" 30. *Isle Jesus.* Smallwood.
" 31. *Toronto.* Kingston.
June 4. *Netherlands.* Ballot.
" 13. *Toronto.* Kingston.
" 19. *Toronto.* Kingston.
July 5. *Toronto.* Kingston. *Netherlands.* Ballot.
" 9. *Toronto.* Kingston.
" 17. *Toronto.* Kingston.
" 19. *Senftenberg.* Brorsen. Heis.
" 23. *Toronto.* Kingston.

[1] Wochenschrift für Astronomie etc., Neue Folge, Jahrgang VI. 104.

July 24. *Toronto.* Kingston.
* " 27. *Milan.* Schiaparelli.
" 31. *Toronto.* Kingston. [Heis.
Aug. 2. *New York, U. S. A.* Heis. *Havana.* Poey.
* " 4. *Isle Jesus.* Smallwood.
* " 4. *Munster.* Heis. *Peckeloh.* Weber. Heis.
* " 4. *Munich.* Heis. *Milan.* Schiaparelli.
* " 4. *Netherlands.* Ballot.
" 8. *Isle Jesus.* Smallwood.
" 9. *Toronto.* Kingston.
" 13. *Toronto.* Kingston.
" 13. *Isle Jesus.* Smallwood.
* " 18. *Isle Jesus.* Smallwood.
* " 18. *Toronto.* Kingston.
" 19. *Isle Jesus.* Smallwood.
" 19. *Toronto.* Kingston. *Netherlands.* Ballot.
" 20. *Christiania.* Fearnley.[1]
" 21. *Milan.* Schiaparelli.
" 23. *Toronto.* Kingston.
" 24. *Toronto.* Kingston.
* " 28. *Toronto.* Kingston.
* " 28. *Senftenberg.* Brorsen. Heis.
* " 28. *Peckeloh.* Weber. Heis.
* " 28. *Milan.* Schiaparelli.
* " 29. *Toronto.* Kingston. *Isle Jesus.* Smallwood.
* " 30. *Toronto.* Kingston.
*Sept. 1. *Toronto.* Kingston.
" 2. *Toronto.* Kingston.
" 3. *Isle Jesus.* Smallwood.
" 9. *Toronto.* Kingston.
" 9. *Isle Jesus.* Smallwood.
* " 11. *Peckeloh.* Weber. Heis.
" 19. *Toronto.* Kingston.
" 19. *Isle Jesus.* Smallwood.
* " 24. *Isle Jesus.* Smallwood.
* " 24. *Toronto.* Kingston. *Stockholm.* Ballot.
* " 24. *Peckeloh.* Weber. Heis.
* " 24. *Senftenberg.* Brorsen. Heis.
* " 25. *Toronto.* Kingston.
* " 25. *Isle Jesus.* Smallwood.
* " 25. *Aalesund.* Fearnley.
* " 26. *Toronto.* Kingston.
* " 26. *Isle Jesus.* Smallwood.
* " 27. *Isle Jesus.* Smallwood.
* " 27. *Toronto.* Kingston.
" 28. *Isle Jesus.* Smallwood.
" 28. *Peckeloh, Stockholm?* Heis.
" 30. *Peckeloh.* Weber. Heis.
*Oct. 3. *Mandal.* Fearnley.

[1] Probably a misprint for August 29 or August 30.

*Oct. 4. *Toronto.* Kingston.
* " 4. *Isle Jesus.* Smallwood.
" 9. *Utrecht.* Heis.
* " 11. *Toronto.* Kingston. *Aalesund.* Fearnley.
" 12. *Toronto.* Kingston.
" 13. *Toronto.* Kingston.
" 15. *Senftenberg.* Brorsen. Heis.
" 17. *Peckeloh.* Weber. Heis.
" 22. *Toronto.* Kingston.
" 23. *Aalesund.* Fearnley.
" 25. *Aalesund.* Fearnley.
* " 29. *Toronto.* Kingston.
* " 29. *Aalesund.* Fearnley.
* " 30. *Stockholm, Haparanda.* Ballot. Heis.
* " 30. *Skudesnes.* Fearnley.
Nov. 9. *Christiansund.* Fearnley.
" 11. *Isle Jesus.* Smallwood.
" 17. *Skudesnes.* Fearnley.
" 18. *Aalesund.* Fearnley.
" 20. *Aalesund.* Fearnley.
" 29. *Peckeloh.* Weber. Heis.
Dec. 2. *Aalesund.* Fearnley.
" 4. *Isle Jesus.* Smallwood.
" 5. *Aalesund.* Fearnley.
" 9. *Skudesnes.* Fearnley.
" 12. *Isle Jesus.* Smallwood.
" 14. *Queenstown, Greenwich, Penzance, Rome,*
" 14. *Munich, Montpellier, Cracow, Moscow,*
" 14. *St. Petersburg, Leipsic.* Ballot.
" 14. *Netherlands.* Ballot.
" 14. *Marseilles, Berlin, Peckeloh.* Heis.
" 14. *Sandösund.* Fearnley.[1]
" 14. *Parenzo.* Polesino.
" 15. *Aalesund.* Fearnley.
" 15. *Netherlands.* Ballot.
" 24. *Skudesnes.* Fearnley.
" 26. *Aalesund.* Fearnley.

1863.

Jan. 8. *Christiansund.* Mohn.[2]
" 10. *Christiania.* Fearnley.
" 12. *Christiansund.* Mohn.
" 12. *Arensburg, Insel Oesel.* Heis. Sass.
" 16. *Toronto.* Kingston.
" 18. *Christiania.* Fearnley.
" 24. *Toronto.* Kingston. *Bogoslowski.*
" 24. *Skudesnes.* Fearnley.
* " 25. *Toronto.* Kingston.

[1] Nederlandsch Meteorologisch Jaarboek, 1863, pp. 302, 319.
[2] Meteorologiske Iagttagelser i det Sydlige Norge, p. 2.

*Jan. 25. *Stockholm, Netherlands.* Ballot. Heis.
" 26. *Sandösund.* Fearnley.
Feb. 6. *Skudesnes.* Fearnley.
" 9. *Berlin.* Heis.
" 16. *Aalesund.* Fearnley.
" 18. *Toronto.* Kingston.
* " 22. *Toronto.* Kingston. *Haparanda.* Heis.
* " 22. *Netherlands.* Ballot.
* " 23. *Toronto.* Kingston. Lüdingen. Ballot.
* " 23. *St. Petersburg.* Kupffer.[1]
* " 23. *Aalesund.* Fearnley. *Skudesnes.*
* " 23. *Haparanda.* Ballot. *Stockholm.* Heis.
" 24. *Sandösund.* Fearnley.
* " 25. *Toronto.* Kingston. *Skudesnes.* Fearnley.
March 4. *Sitka.* Kupffer.
" 12. *Toronto.* Kingston.
" 18. *Peckeloh.* Weber. Heis.
" 20. *Toronto.* Kingston.
* " 21. *Mandal.* Fearnley. *Peckeloh.* Weber.
" 23. *Stockholm.* Ballot. Heis.
* " 24. *Stockholm?* Heis.
" 25. *Toronto.* Kingston.
" 26. *Christiania.* Fearnley.
" 29. *Toronto.* Kingston.
" 30. *Toronto.* Kingston.
April 2. *Insel Oesel.* Sass. Heis.
" 3. *Insel Oesel.* Sass. Heis.
" 5. *Insel Oesel.* Sass. Heis.
" 6. *Cambridge.* Bond. Lovering.
" 6. *Insel Oesel.* Sass. Heis.
" 8. *Toronto.* Kingston.
* " 9. *Toronto.* Kingston. *Peckeloh.* Weber.
" 12. *Toronto.* Kingston.
* " 15. *Haparanda, Stockholm.* Ballot. Heis.
* " 16. *Stockholm.* Heis.[2]
* " 19. *Toronto, Stockholm?* Heis.
* " 21. *Toronto.* Kingston.
" 22. *Insel Oesel.* Sass. Heis.
May 6. *Netherlands.* Ballot.
" 9. *Cracow.* Heis.
June 9. *Toronto.* Kingston.
" 10. *Toronto.* Kingston.
" 13. *Toronto.* Kingston.
" 22. *Toronto.* Kingston.
" 23. *Netherlands.* Ballot.
July 6. *Toronto.* Kingston.

[1] Annales de l'Observ. Physique Centrale de Russie, 1863, pp. 32 and 307.
[2] Wochenschrift für Astronomie etc., Neue Folge, Jahrgang VII. 9.

July 15. *Toronto.* Kingston.
" 17. *Toronto.* Kingston.
" 18. *Toronto.* Kingston.
" 19. *Toronto.* Kingston.
" 24. *Toronto.* Kingston.
Aug. 5. *Toronto.* Kingston.
" 6. *Toronto.* Kingston.
" 13. *Toronto.* Kingston.
* " 14. *Sitka.* Kupffer.
" 15. *Toronto.* Kingston.
" 17. *Toronto.* Kingston. *Munster.* Heis.
Sept. 7. *Dorpat.* Ballot.
" 8. *Toronto.* Kingston.
" 8. *St. Petersburg.* Kupffer. *Dorpat.* Ballot.
* " 9. *Toronto.* Kingston. *Sitka.* Kupffer.
* " 9. *Stockholm.* Ballot.
" 10. *Toronto.* Kingston.
" 16. *Toronto.* Kingston.
" 18. *Toronto.* Kingston.
" 19. *Toronto.* Kingston.
" 22. *Toronto.* Kingston.
* " 23. *Toronto.* Kingston.
*Oct. 7. *Aalesund.* Fearnley. *Skudesnes.*
* " 7. *Euküll, Insel Oesel.* Sass. Heis.
* " 7. *Peckeloh.* Weber. Heis.
" 8. *Toronto.* Kingston. *Euküll.* Sass. Heis.
" 8. *Aalesund.* Fearnley. *Skudesnes.*
" 8. *Dorpat, Peckeloh.* Weber. Heis.
" 9. *Aalesund.* Fearnley.
* " 10. *Toronto.* Kingston.
" 11. *Munster.* Heis.
" 12. *Toronto.* Kingston.
" 16. *Aalesund.* Fearnley.
Nov. 1. *Toronto.* Kingston.
" 2. *Christiania.* Fearnley.
" 7. *Skudesnes.* Fearnley.
" 8. *Christiania.* Fearnley.
" 9. *Munster.* Heis. *Utrecht.* Ballot.
" 10. *Peckeloh.* Weber. *Lichtenberg.* Heis.
* " 13. *Athens.* Schmidt. Heis.
* " 14. *Insel Oesel.* Sass. Heis.
* " 14. *Aalesund.* Fearnley.
* " 14. *St. Petersburg.* Kupffer.
" 15. *Insel Oesel.* Sass. Heis.
" 29. *Munster, Peckeloh.* Weber. Heis.
Dec. 1. *Stockholm.* Heis. *Aalesund.* Fearnley.
" 2. *Insel Oesel.* Sass. *Stockholm.* Heis.
" 3. *Christiania?* Ballot.[1]
" 8. *Christiania.* Fearnley.

[1] Nederlandsch Meteorologisch Jaarboek, 1864, pp. 276, 300.

Dec. 10. *Athens.* Schmidt. *Insel Oesel.* Sass. Heis.
" 11. *Christiania.* Fearnley. *Athens.* Schmidt.
" 12. *Christiania.* Fearnley. [Heis.
" 12. *Aalesund.* Fearnley.

1864.

Jan. 1. *Insel Oesel.* Sass. Heis.
" 5. *Peckeloh.* Weber. Heis.
" 6. *Peckeloh.* Weber. Heis.
" 9. *Aalesund.* Fearnley.
" 12. *Aalesund.* Fearnley.
" 13. *Christiania.* Fearnley.[1]
" 14. *Peckeloh.* Weber. Heis.
" 17. *Peckeloh.* Weber. Heis.
" 28. *Christiania.* Fearnley.
Feb. 1. *Toronto* Kingston.
" 5. *Christiania, Skudesnes.* Fearnley.
" 8. *Toronto.* Kingston.
" 9. *Toronto.* Kingston.
" 10. *Toronto.* Kingston.
" 10. *Christiania.* Fearnley.
" 11. *Aalesund.* Fearnley.
" 28. *Aalesund.* Fearnley.
" 29. *Christiania.* Fearnley.
March 5. *Aalesund, Christiania.* Fearnley.
" 6. *Toronto.* Kingston. *Aalesund.* Fearnley.
" 6. *Peckeloh.* Weber. Heis.
" 7. *Toronto.* Kingston.
" 9. *Lichtenberg.* Heis. *Aalesund.* Fearnley.
" 10. *Naugard.* Klopsch. *Lichtenberg.* Heis.
" 10. *Peckeloh.* Weber. Heis.
" 10. *Aalesund.* Fearnley. *Munster.* Heis.
" 14. *Hanover.* Heis
" 27. *Insel Oesel.* Sass. Heis.
" 29. *Aalesund.* Fearnley.
" 30. *Aalesund, Skudesnes.* Fearnley.
" 30. *Christiania.* Fearnley.
" 31. *Christiania.* Fearnley.
April 1. *Sitka.* Kämtz.
" 2. *Christiania.* Fearnley.
" 4. *Aalesund, Christiania.* Fearnley.
" 5. *Munster.* Heis.
" 6. *Christiania.* Fearnley.
" 7. *Christiania.* Fearnley. *Toronto.* Kingston.
" 24. *Toronto.* Kingston.
" 25. *Sitka.* Kämtz.
" 27. *Toronto.* Kingston.
" 27. *Christiania.* Fearnley. *Munster.* Heis.
" 27. *Peckeloh.* Weber. *Naugard.* Heis.
" 29. *Toronto.* Kingston.

[1] Meteorologiske Iagttagelser paa Christiania Observatorium.

May 3. *Toronto.* Kingston.
" 5. *Toronto.* Kingston. *Christiania.* Fearnley.
" 28. *Toronto.* Kingston.
*June 7. *Toronto.* Kingston.
" 9. *Toronto.* Kingston.
" 10. *Toronto.* Kingston.
" 11. *Toronto.* Kingston.
" 18. *Lisbon.* Heis.
" 28. *Toronto.* Kingston.
July 12. *Toronto.* Kingston.
" 18. *Toronto.* Kingston.
" 19. *Toronto.* Kingston.
Aug. 1. *Kephissia.* Schmidt. Heis.
" 2. *Kephissia.* Schmidt. Heis.
" 2. *Lichtenberg.* Bornitz. Heis.
" 6. *Kephissia.* Schmidt. Heis.
" 9. *Kephissia.* Schmidt. Heis.
" 13. *Toronto.* Kingston.
* " 14. *Toronto.* Kingston.
" 25. *Toronto.* Kingston. *Sitka.* Kämtz.
" 28. *Toronto.* Kingston.
" 30. *Toronto.* Kingston. *Christiania.* Fearnley.
" 31. *Toronto.* Kingston. *Naugard.* Klopsch.
" 31. *Nairn, Scotland. France.* Heis.
" 31. *Peckeloh?* Weber. *Arona?* Heis.
Sept. 13. *Peckeloh.* Weber. Heis.
* " 20. *Toronto.* Kingston.
" 21. *Toronto.* Kingston.
" 22. *Toronto.* Kingston.
" 24. *Toronto.* Kingston.
" 25. *Aardenburg, Neth.* Roos. Ballot.
" 27. *Peckeloh.* Weber. Heis.
" 29. *Christiania.* Fearnley.
Oct. 8. *Christiania.* Fearnley. *Munster.* Heis.
" 8. *Haparanda, Peckeloh.* Weber. Heis.
" 9. *Stockholm.* Heis. *Christiania.* Fearnley.
" 12. *Toronto.* Kingston.
" 13. *Christiania.* Fearnley.
" 14. *Stockholm, Haparanda.* Heis.
" 14. *Christiania.* Fearnley.
" 15. *Lichtenberg.* Heis.
" 19. *Toronto.* Kingston. *Aalesund.* Fearnley.
" 19. *Peckeloh.* Weber. Heis.
" 19. *Valencia, Ireland.* Heis.
" 19. *Insel Oesel.* Sass. *Lichtenberg.* Heis.
" 21. *Insel Oesel.* Sass. *Paris.* Heis.
" 22. *Insel Oesel.* Sass. Heis.
" 24. *Aalesund.* Fearnley.
" 26. *Aalesund.* Fearnley.
" 28. *Stockholm.* Heis.
Oct. 29. *St. Petersburg.* Kämtz.
" 29. *Insel Oesel.* Sass. *Stockholm.* Heis.
Nov. 3. *Christiania.* Fearnley.
" 6. *Insel Oesel.* Sass. Heis.
* " 19. *Toronto.* Kingston.
" 23. *Peckeloh.* Weber. Heis.
" 30. *Jülich.* Heis. *Aalesund.* Fearnley.
Dec. 1. *Stockholm.* Ballot. Heis.[1]
" 11. *Peckeloh.* Weber. *Lichtenberg.* Heis.
" 12. *Hërnosaud.* Ballot. Heis.
" 18. *Lichtenberg.* Bornitz. Heis.
" 21. *Christiania.* Fearnley.
" 22. *Lichtenberg, Hërnosaud.* Heis.
" 22. *Catherinebourg.* Kämtz.
" 23. *Peckeloh.* Weber. Munster. Heis.
" 23. *Stockholm.* Ballot. Heis..
" 24. *Frankenthal, Munster, Stockholm.* Heis.
" 24. *Hernosand, Haparanda.* Ballot. Heis.
" 29. *Lichtenberg.* Bornitz. Heis.
" 30. *Lichtenberg.* Bornitz. Heis.
" 31. *Lichtenberg.* Bornitz. Heis.

1865.

Jan. 5. *Stockholm.* Ballot. Heis.
" 5. *Christiania.* Fearnley.
" 7. *Stockholm.* Ballot. Heis.
" 9. *Rome.* Ballot. Heis.
" 11. *Stockholm.* Ballot. Heis.
" 13. *Peckeloh.* Weber. Heis.
" 16. *Montreal.* Smallwood.
" 17. *Toronto.* Kingston.[2]
" 17. *Lichtenberg.* Ballot. *Peckeloh.* Heis.[3]
" 17. *Munster.* Heis. *Marseilles.* Ballot.
" 19. *Toronto.* Kingston.
" 24. *Munster.* Heis.
" 24. *Hernosand, Marseilles.* Ballot.
" 25. *Leeuwarden, Netherlands.* Ballot.
" 27. *Paris.* Ballot. Heis.
" 28. *Mandal.* Fearnley.
" 28. *Aalesund.* Fearnley. *Skudesnes.*
" 28. *Haparanda.* Ballot. Heis.
" 29. *Toronto.* Kingston.
" 29. *Lichtenberg.* Heis. *Haparanda.* Ballot.
" 29. *Christiania, Skudesnes.* Fearnley.
" 30. *Lichtenberg.* Heis.
" 31. *Stockholm.* Ballot. Heis.

[1] Nederlandsch Meteorol. Jaarboek, ., II. 157.
[2] Monthly Meteorological Register at Toronto, Canada West.
[3] Wochenschrift für Astronomie etc, Neue Folge, Jahrgang VIII., 5 &c.

Jan. 31. *Christiania.* Fearnley.
Feb. 1. *Haparanda.* Ballot. Heis.
" 4. *Eichüll, Insel Oesel.*[1] Ballot.
" 5. *Eichüll, Insel Oesel.* Ballot.
" 7. *St. Petersburg, Greenwich.* Ballot. Heis.
" 7. *Munster.* Ballot. Heis.
" 16. *Insel Oesel.* Sass. Heis. Ballot.
" 17. *Insel Oesel.* Sass. Heis. Ballot.
" 17. *Peckeloh, Munster.* Ballot. Heis.
" 17. *Aalesund.* Fearnley.
" 17. *Hernosand.* Ballot. Heis.
" 17. *Cork, Ireland.* Stevelly.
" 18. *Lichtenberg, Naugard.* Heis.
" 18. *Insel Oesel.* Sass. Heis. *Berlin?* Ballot.
" 19. *Aalesund.* Fearnley.
" 20. *Cambridge.* Lovering. *Toronto.* Kingston.
" 20. *Montreal.* Smallwood.
" 20. *Skudesnes, Christiania.* Fearnley.
" 21. *Cambridge.* Lovering. *Toronto.* Kingston.
" 21. *Hernosand, Lichtenberg.* Ballot. Heis.
" 21. *Insel Oesel.* Sass. *Peckeloh.* Ballot. Heis.
" 21. *Aalesund.* Fearnley. *Skudesnes.*
" 21. *Christiania.* Fearnley.
" 22. *Toronto.* Kingston.
" 22. *Lichtenberg.* Ballot. Heis.
" 22. *Hernosand, Berlin.* Ballot.
" 22. *Christiania.* Fearnley.
" 22. *Insel Oesel.* Sass. Heis.
" 23. *Toronto.* Kingston.
" 23. *Lichtenberg.* Ballot. Heis.
" 26. *Hernosand.* Ballot. Heis.
" 27. *Lichtenberg.* Heis. *Berlin.* Ballot.
March 7. *Gorcy bei Metz.* Ballot. Heis.
" 15. *Toronto.* Kingston.
" 16. *Christiania.* Fearnley.
" 17. *Hernosand.* Ballot. Heis.
" 17. *Stockholm, St. Petersburg.* Heis.
" 17. *Christiania.* Fearnley.
" 18. *Peckeloh, Bamberg.* Ballot. Heis.
" 19. *Lichtenberg.* Ballot. Heis.
" 20. *Toronto.* Kingston.
" 20. *Peckeloh.* Ballot. *Naugard.* Heis.
" 20. *Lichtenberg, Munster.* Ballot. Heis.
" 20. *Netherlands, Stockholm.* Ballot.
" 20. *Skudesnes, Christiania.* Fearnley.
" 21. *Lichtenberg.* Ballot. Heis.
" 21. *Hernosand.* Heis. *Bamberg.* Ballot.
" 22. *Lichtenberg, Bamberg.* Ballot. Heis.

[1] The auroras of Feb. 4 and 5 are probably the same as those of Feb. 16 and 17 expressed in *old* style. Same as *Eukül.*

March 23. *Lichtenberg.* Ballot. Heis.
" 25. *Christiania.* Fearnley.
" 27. *Hernosand, Haparanda.* Ballot. Heis.
" 27. *Stockholm.* Ballot.
" 27. *Christiania.* Fearnley.
" 28. *Cambridge.* Lovering.
" 29. *St. Petersburg.* Ballot. Heis.
" 29. *Stockholm, Haparanda.* Ballot. Heis.
" 29. *Christiania.* Fearnley.
" 30. *Toronto.* Kingston.
" 30. *Christiania.* Fearnley.
April 13. *Christiania.* Fearnley.
" 14. *Christiania.* Fearnley.
" 15. *Toronto.* Kingston.
" 16. *Toronto.* Kingston.
" 16. *Peckeloh, Munster.* Ballot. Heis.
" 16. *Christiania.* Fearnley.
" 17. *Toronto.* Kingston.
" 18. *Toronto.* Kingston.
" 19. *Stockholm.* Ballot. Heis.
May 13. *Toronto.* Kingston.
" 16. *Toronto.* Kingston.
" 19. *Toronto.* Kingston.
" 25. *Toronto.* Kingston.
" 26. *Toronto.* Kingston.
June 10. *Toronto.* Kingston.
" 15. *Toronto.* Kingston.
" 16. *Toronto.* Kingston.
" 17. *Athens.* Schmidt. Heis.
" 20. *Toronto.* Kingston.
" 21. *Toronto.* Kingston.
" 23. *Toronto.* Kingston.
July 7. *Toronto.* Kingston.
" 12. *Cambridge.* Lovering.
" 13. *Toronto.* Kingston. *Cambridge.* Lovering.
" 14. *Toronto.* Kingston.
" 17. *Toronto.* Kingston.
" 18. *Toronto.* Kingston.
" 19. *Toronto.* Kingston. *Peckeloh.* Ballot. Heis.
" 22. *North Conway, N. H.* Lovering.
" 22. *Toronto.* Kingston.
Aug. 2. *North Conway, N. H.* Lovering.
" 2. *Toronto.* Kingston. *NewHaven.* A.C.T.[1]
" 2. *Munster, Peckeloh.* Ballot. Heis.
" 2. *Magdeburg.* Ballot. Heis.
" 3. *Christiania.* Fearnley.
" 4. *Toronto.* Kingston.
" 4. *North Conway, N. H.* Lovering.
" 12. *Toronto.* Kingston. *Stockholm.* Ballot.

[1] Amer. Journ. Sci., Second Series, XL. 285.

Aug. 14. *North Conway, N. H.* Lovering.
" 14. *Toronto.* Kingston. *Peckeloh.* Ballot. Heis.
" 16. *Toronto.* Kingston.
" 18. *North Conway, N. H.* Lovering.
" 18. *Toronto.* Kingston.
" 18. *Leeuwarden, Netherlands.* Ballot.
" 19. *North Conway, N. H.* Lovering.
" 19. *Munster.* Heis. *Palermo?* Ballot.
" 19. *Papenburg.* Heis.
" 20. *Christiania.* Fearnley.
" 22. *Toronto.* Kingston.
" 22. *Haparanda, Stockholm.* Ballot.
" 24. *Stockholm.* Ballot.
" 25. *Toronto.* Kingston. *Cambridge.* Lovering.
" 25. *Christiania.* Fearnley.
" 26. *Cambridge.* Lovering. *Papenburg.* Heis.
" 26. *Munster, Peckeloh, Palermo?* Ballot. Heis.
" 26. *Brouwershavn, Netherlands.* Ballot.
" 26. *Christiania.* Fearnley.
Sept. 11. *Toronto.* Kingston.
" 12. *Cambridge.* Lovering. *Toronto.* Kingston.
" 15. *Cambridge.* Lovering. *Toronto.* Kingston.
" 16. *Cambridge.* Lovering. *Toronto.* Kingston.
" 16. *Peckeloh.* Ballot. Heis. [ley.
" 17. *Cambridge.* Lovering. *Christiania.* Fearn-
" 18. *Toronto.* Kingston.
" 20. *Toronto.* Kingston
" 21. *Peckeloh.* Ballot. Heis.
" 23. *Christiania.* Fearnley.
" 26. *Toronto.* Kingston.
" 26. *Papenburg.* Ballot. Heis.
" 26. *Christiania.* Fearnley.
" 27. *Stockholm, Haparanda.* Ballot. [ley.
" 28. *Cambridge.* Lovering. *Christiania.* Fearn-
Oct. 5. *Toronto.* Kingston.
" 5. *Nairn, Haparanda.* Ballot.
" 9. *Toronto.* Kingston.
" 10. *Toronto.* Kingston. *Stockholm.* Ballot.
" 10. *Christiania.* Fearnley.
" 11. *Toronto.* Kingston.
" 12. *Cambridge.* Lovering.
" 12. *Insel Oesel.* Sass. Ballot. Heis.
" 13. *Peckeloh.* Ballot. Heis.
" 14. *Christiania.* Fearnley.
" 14. *Peckeloh.* Ballot. Heis.
" 15. *Toronto.* Kingston.
" 16. *Christiania.* Fearnley.
" 19. *Toronto.* Kingston.
" 20. *Toronto.* Kingston.
" 23. *Toronto.* Kingston.
Oct. 26. *Christiania, Sandösund.* Fearnley.
" 27. *Eichüll, Insel Oesel.* Ballot.
" 28. *Peckeloh.* Ballot. Heis.
" 31. *Toronto.* Kingston.
" 31. *Peckeloh.* Ballot. Heis.
Nov. 7. *Hernosand.* Ballot. *Skudesnes.* Fearnley.
" 8. *Haparanda, Vendome.* Ballot.
" 9. *Papenburg.* Ballot. Heis.
" 9. *Christiania.* Fearnley.
" 11. *Christiania.* Fearnley.
" 14. *Aalesund, Christiania.* Fearnley.
" 14. *Skudesnes, Sandösund.* Fearnley.
" 14. *Peckeloh, Munster.* Ballot. Heis.
" 14. *Palermo?* [1], *Stockholm.* Ballot.
" 14. *Papenburg.* Heis.
" 15. *Toronto.* Kingston.
" 28. *Haparanda.* Ballot.
Dec. 13. *Stockholm, Hernosand.* Ballot.[2]
" 14. *Christiania.* Fearnley.
" 15. *Munich.* Ballot.
" 20. *Christiania.* Fearnley.

1866.

Jan. 2. *Toronto.* Kingston.
" 8. *Toronto.* Kingston. *Cambridge.* Lovering.
" 8. *Aalesund.* Fearnley.
" 10. *Christiania.* Fearnley.
" 11. *Christiania.* Fearnley.
" 16. *Cambridge.* Lovering.
" 20. *Toronto.* Kingston. *Christiania.* Fearnley.
" 27. *Cambridge.* Lovering.
Feb. 3. *Christiania.* Fearnley.
" 5. *Christiania.* Fearnley.
" 7. *Aalesund.* Fearnley.
" 7. *Bywell, North Shields.* Wheeler.[3]
" 8. *Aalesund.* Fearnley.
" 12. *Toronto.* Kingston. *North Shields.* Wheeler.
" 13. *North Shields.* Wheeler.
" 13. *Christiania.* Fearnley.
" 14. *Ancona, Naples, Haparanda.* Ballot.
" 16. *Toronto.* Kingston. *Cambridge.* Lovering.
" 17. *Aalesund.* Fearnley.
" 20. *Toronto.* Kingston.
" 25. *Stockholm.* Ballot. *Aalesund.* Fearnley.
March 5. *Toronto.* Kingston. *Cambridge.* Lovering.
" 6. *Toronto.* Kingston. *Cambridge.* Lovering.
" 6. *Haparanda.* Ballot.

[1] Probably intended for Papenburg.
[2] Nederlandsch Meteorol. Jaarboek, 1866, II. 159.
[3] Nat. Hist. Transactions of Northumberland and Durham, I. 1285.

March 6. *Christiania.* Fearnley.
" 7. *Peckeloh.* Ballot. Skudesnes. Fearnley.
" 7. *Haparanda.* Ballot.
" 7. *Christiania.* Fearnley.
" 8. *Christiania.* Fearnley.
" 9. *Toronto.* Kingston. *Christiania.* Fearnley.
" 9. *Haparanda.* Ballot.
" 10. *Toronto.* Kingston.
" 10. *Hernosand, Haparanda.* Ballot.
" 16. *Toronto.* Kingston.
" 16. *Stockholm, Haparanda.* Ballot.
" 17. *Toronto.* Kingston.
" 17. *Paris, Haparanda.* Ballot.
" 18. *Cambridge.* Lovering.
" 22. *Munich.* Ballot.
" 29. *Rome.* Ballot.
April 7. *Hernosand.* Ballot.
" 11. *Stockholm.* Ballot.
" 16. *Cambridge.* Lovering.
" 17. *Toronto.* Kingston. *Cambridge.* Lovering.
" 17. *Christiania.* Fearnley.
" 19. *Christiania.* Fearnley.
May 3. *Toronto.* Kingston. *Cambridge.* Lovering.
" 4. *Toronto.* Kingston.
" 6. *Toronto.* Kingston.
" 12. *Toronto.* Kingston.
" 14. *Toronto.* Kingston. *Cambridge.* Lovering.
" 18. *Toronto.* Kingston.
" 19. *Toronto.* Kingston.
June 12. *Toronto.* Kingston.
" 15. *Cambridge.* Lovering.
July 12. *Toronto.* Kingston. *Cambridge.* Lovering.
" 14. *Toronto.* Kingston.
" 25. *Toronto.* Kingston.
Aug. 9. *Toronto.* Kingston.
" 11. *Toronto.* Kingston.
" 18. *Christiania.* Fearnley.
" 23. *Toronto.* Kingston. *Christiania.* Fearnley.
" 30. *Toronto.* Kingston.
Sept. 3. *Toronto.* Kingston.
" 6. *Cambridge.* Lovering.
" 12. *Toronto.* Kingston. *Cambridge.* Lovering.
" 13. *Toronto.* Kingston.
Oct. 3. *Toronto.* Kingston. *Cambridge.* Lovering.
" 3. *Aalesund.* Fearnley.
" 4. *Toronto.* Kingston. *Cambridge.* Lovering.
" 4. *Christiania.* Fearnley. *Aalesund.* Fearnley.
" 5. *Toronto.* Kingston.
" 7. *Christiania.* Fearnley.
" 9. *Toronto.* Kingston.
Oct. 10. *Christiania.* Fearnley.
" 11. *Toronto.* Kingston. *Christiania.* Fearnley.
" 12. *Christiania.* Fearnley.
" 13. *Toronto.* Kingston.
" 18. *Aalesund.* Fearnley.
" 30. *Toronto.* Kingston.
" 31. *Toronto.* Kingston.
Nov. 2. *Toronto.* Kingston.
" 3. *Toronto.* Kingston. *Aalesund.* Fearnley.
" 6. *Christiania.* Fearnley.
" 7. *Christiania.* Fearnley.
" 9. *Christiania.* Fearnley. *Allenheads.* Wheeler.
" 10. *Haparanda, Aalesund.* Fearnley.
" 11. *Allenheads, North Shields.* Wheeler.
" 12. *Christiania.* Fearnley.
" 19. *Christiania.* Fearnley. *Allenheads.* Wheeler.
" 28. *Christiania.* Fearnley. *Stockholm.* Ballot.
" 29. *Christiania.* Fearnley.
" 29. *Aalesund.* Fearnley. *Bywell.* Wheeler.
" 30. *Aalesund.* Fearnley.
Dec. 2. *Toronto.* Kingston.
" 10. *Christiania.* Fearnley.
" 25. *Allenheads, Bywell.* Wheeler.

1867.

March 7. *Toronto.* Kingston.
April 8. *Toronto.* Kingston.
" 24. *Toronto.* Kingston.
May 1. *Toronto.* Kingston.
" 2. *Toronto.* Kingston. *Cambridge.* Lovering.
" 4. *Cambridge.* Lovering.
" 27. *Cambridge.* Lovering.
" 31. *Burlington, Vt., Concord, N.H.* Lovering.
July 28. *Cambridge.* Lovering.
Aug. 4. *Gorham, N. H.* Lovering.
" 5. *Mt. Washington, N. H.* Lovering.
" 21. *Burlington, Vt.* Lovering.
" 26. *Burlington, Vt., Gorham, N.H.* Lovering.
Sept. 21. *Cambridge.* Lovering.
" 23. *Cambridge.* Lovering.
" 25. *Cambridge.* Lovering.
" 26. *Manchester, Mass.* Lovering.
" 29. *Manchester, Mass.* Lovering.

1868.

March 19. *Cambridge.* Lovering.
" 24. *Cambridge.* Lovering.
April 13. *Cambridge.* Lovering.
" 17. *Cambridge.* Lovering.
" 18. *Cambridge.* Lovering.
July 10. *Cambridge.* Lovering.

LVIII. AURORAS OBSERVED AT TORONTO, CANADA, ARRANGED BY YEARS AND MONTHS.

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1840	2	2	3	2	1	.	.	5	7	3	1	3	29
1841	4	3	2	5	1	1	6	5	3	6	2	2	40
1842	2	.	.	4	.	2	6	1	6	.	.	1	22
1843	.	.	2	2	.	1	4	1	5	1	.	1	17
1844	1	.	3	1	4	1	1	1	3	1	1	.	17
1845	1	.	2	1	.	1	1	2	5	1	1	.	15
1846	1	1	1	2	6	.	7	8	6	5	.	1	38
1847	.	1	4	3	1	2	3	4	1	6	6	1	37
1848	12	8	9	11	9	2	3	4	1	8	13	2	71
1849	4	7	8	5	7	2	8	4	6	7	8	3	69
1850	4	4	4	7	5	1	5	4	6	8	2	.	50
1851	1	3	7	2	3	5	5	7	9	10	9	12	73
1852	7	8	5	9	14?	9	11	7	11	7	10	4	102
1853	2	4	8	7	8	5	6	2	7	6	2	6	65
1854	3	4	12	8	6	2	4	1	6	5	2	1	54
1855	1	4	5	9	3	1	2	6	2	4	5	1	46
1856	.	5	7	4	.	1	4	5	3	3	1	1	34
1857	.	1	2	1	3	1	5	1	6	2	2	2	26
1858	2	6	4	4	5	4	5	6	8	10	3	2	59
1859	.	3	8	7	4	3	4	4	8	5	2	3	53
1860	5	2	12	7	7	2	6	8	6	.	1	2	58
1861	.	3	6	6	5	2	1	4	5	6	1	4	43
1862	4	1	2	5	5	2	6	9	8	6	.	.	48
1863	3	1	5	5	.	4	6	5	8	3	1	.	41
1864	.	1	2	4	3	5	3	6	4	2	1	.	31
1865	3	4	2	4	5	5	7	8	7	9	1	.	55
1866	3	3	8	1	7	1	3	4	3	8	2	1	44
1867	.	.	1	2	2	.	.	.	.	.	.	.	5
Total*	54	85	133	126	112	68	122	122	153	132	77	58	1242

LIX. AURORAS OBSERVED AT ABO,† FINLAND, ARRANGED BY YEARS AND MONTHS.

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1823	.	.	.	.	.	.	.	.	1	.	.	.	1
1824	.	.	2	.	.	.	.	.	.	.	1	1	4
1825	.	1	1	.	.	.	.	3	3	1	.	3	12
1826	4	2	1	.	.	.	.	.	.	.	3	.	10
1827	.	4	1	2	.	.	.	1	3	3	3	.	17
1828	1	3	1	.	.	.	.	4	6	3	3	4	25
1829	.	2	5	4	.	.	.	.	5	4	7	3	30
1830	4	2	4	1	2	.	.	1	5	9	4	3	35
1831	9	5	5	10	.	.	.	.	.	.	.	.	29
Total	18	19	20	17	2	0	0	9	23	20	21	14	163

AURORAS OBSERVED AT FORT RELIANCE, ARRANGED BY YEARS AND MONTHS.

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1833	.	.	.	.	.	.	.	.	.	.	14	16	30
1834	28	14	17	22	1	.	.	.	.	3	14	26	125
1835	19	12	10	.	.	.	.	.	.	.	.	.	41
Total	47	26	27	22	1	0	0	0	0	3	28	42	196

* The auroras for the year 1867 are not included in this total.

† This and the following table are based upon the observations of Argelander.

LX. AURORAS OBSERVED AT HELSINGFORS, ARRANGED BY YEARS AND MONTHS.

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1832	.	.	.	.	.	.	.	1	1	1	2	.	5
1833	.	.	1	.	.	.	.	.	1	.	.	.	2
1835	.	.	.	.	.	.	.	1	.	.	3	4	8
1836	.	1	2	.	.	.	.	.	5	5	.	.	13
1837	1	1	.	.	.	.	.	.	.	.	.	.	2
Total	1	2	3	0	0	0	0	2	7	6	5	4	30

LXI. AURORAS OBSERVED AT CHRISTIANIA, NORWAY, ARRANGED BY YEARS AND MONTHS.*

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1853	1	3	2	2	.	.	.	3	8	2	3	2	26
1854	2	9	8	9	.	.	.	.	6	3	1	.	38
1855	2	6	1	4	.	.	.	.	2	4	3	.	22
1856	1	1	3	1	.	.	.	3	5	3	2	5	24
1857	.	.	2	.	.	.	.	2	5	1	4	3	17
1858	5	7	3	5	.	.	.	2	4	8	3	2	39
1859	3	4	7	7	.	.	.	1	7	10	4	3	46
1860	2	3	6	6	.	.	.	4	6	3	1	3	34
1861	2	3	4	6	.	.	.	.	3	3	4	4	29
1862	1	3	4	1	.	.	.	3	7	7	1	4	31
1863	3	9	4	5	.	.	.	1	1	5	5	3	36
1864	2	3	3	5	1	.	.	1	1	4	1	1	22
1865	3	3	7	3	.	.	.	4	4	4	3	2	33
1866	3	3	4	2	.	.	.	2	.	5	7	1	27
Total	30	57	58	56	1	0	0	26	59	62	42	33	424
1837–52	46	61	75	60	3	0	1	31	69	61	52	53	512
Total	76	118	133	116	4	0	1	57	128	123	94	86	936

LXII. AURORAS OBSERVED AT ABO† AND HELSINGFORS, ARRANGED BY YEARS AND MONTHS.

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1748	.	.	.	.	.	.	.	.	.	.	.	2	2
1749	.	2	.	2	.	.	.	.	1	1	.	.	6
1750	1	.	4	.	.	.	.	3	3	.	1	.	12
1751	.	2	.	.	.	.	1	1	1	.	.	1	6
1752	2	1	1	1	.	.	.	.	.	7	3	1	16
1753	.	1	1	.	1	.	.	.	4	1	.	1	9
1754	.	1	1	.	1	.	.	.	2	4	1	.	10
1755	1	.	.	.	.	.	.	.	.	.	.	1	2
1757	.	.	.	1	.	.	.	.	.	.	.	.	1
1758	.	1	.	.	.	.	.	.	.	2	1	2	6
1759	3	2	1	2	.	.	.	.	.	1	.	4	13
1760	2	3	.	3	.	.	.	2	1	.	.	.	11
1761	1	2	2	.	1	.	1	.	3	2	2	1	15
1762	2	.	2	2	1	.	.	2	3	1	1	.	14
1763	.	.	2	1	.	.	.	2	1	4	.	1	11
1764	.	3	4	.	.	.	.	.	2	.	.	.	9
1765	2	.	.	1	.	.	.	.	.	.	1	2	6
1766	1	.	1	.	.	.	.	.	.	2	.	2	6
1767	1	.	.	.	.	.	.	1	2	.	.	.	4
1868	2	7	.	1	.	.	.	.	2	3	1	1	17
1769	1	1	1	.	.	.	.	.	2	4	2	2	13
1770	.	1	.	.	.	.	.	2	2	.	.	1	6

* Continued from page 184.

† This table contains the auroras observed at Abo, from 1748 to 1828; and at Helsingfors, from 1829 to 1843. See Memoir by G. G. Hallström in Acta Soc. Sci. Fennicæ, III. 366.

ABO AND HELSINGFORS, (Continued.)

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1771	1	1	1	1	.	.	.	.	1	4	1	2	12
1772	.	4	3	1	.	.	.	1	1	5	4	.	19
1773	3	4	5	.	.	.	.	.	.	.	3	.	15
1774	2	1	4	2	.	.	.	.	3	2	5	2	21
1775	5	.	2	.	.	.	.	.	.	.	.	.	7
1776	1	.	1	2	.	.	.	.	2	.	.	.	6
1777	.	1	2	4	.	.	.	.	.	1	2	2	12
1778	1	.	2	.	.	.	.	.	2	.	.	1	6
1779	1	2	3	.	.	.	.	.	.	.	.	.	6
1782	.	.	.	2	.	.	.	.	1	.	.	.	3
1783	.	.	1	.	.	.	.	.	.	.	.	.	1
1786	.	.	.	.	.	.	.	.	.	.	6	1	7
1787	6	4	4	5	.	.	.	1	4	6	3	3	36
1788	2	2	3	1	.	.	.	.	3	7	1	1	20
1789	.	2	3	1	3	.	.	.	4	.	3	3	19
1790	1	3	6	2	.	.	.	.	5	2	1	2	22
1791	1	.	.	1	.	.	.	.	5	2	1	.	10
1792	.	6	2	3	.	.	.	.	.	1	.	1	13
1793	1	2	3	.	.	.	.	.	.	.	.	1	7
1798	.	1	.	.	.	.	.	.	.	.	.	.	1
1801	.	.	.	.	.	.	.	.	.	2	.	.	2
1802	.	.	2	2	.	.	.	.	.	1	.	.	5
1803	.	.	.	.	.	.	.	.	.	2	1	.	3
1804	.	2	2	1	.	.	.	.	.	.	1	1	7
1805	1	.	.	.	.	.	.	.	.	.	.	1	1
1817	.	.	1	.	.	.	.	.	1	.	.	.	2
1821	.	.	.	1	.	.	.	.	.	.	.	.	1
1823	.	.	.	.	.	.	.	1?	.	.	.	.	1
1824	.	.	2	.	.	.	.	.	.	.	1	1	4
1825	.	1	1	.	.	.	.	3	3	1	.	3	12
1826	4	2	1	.	.	.	.	.	.	1	3	.	11
1827	.	4	1	2	.	.	.	1	3	3	3	.	17
1828	1	3	1	.	.	.	.	4	5	3	3	4	24
1829	.	2	5	4	.	.	.	.	5	3	6	2	27
1830	3	2	4	1	2	.	.	2	5	8	4	3	34
1831	8	5	5	9	.	.	.	.	.	.	.	.	27
1832	.	.	.	.	.	.	.	1	1	2	2	.	6
1833	.	.	1	.	.	.	.	.	4	2	1	.	8
1834	.	.	1	.	.	.	.	.	.	.	1	1	3
1835	2	1	.	.	.	.	.	1	.	.	3	4	11
1836	.	1	2	.	.	.	.	.	5	6	.	.	14
1837	.	2	.	1	.	.	.	.	.	1	.	.	4
1838	1	1	.	.	.	.	.	.	3	.	1	.	6
1839	1	.	1	.	.	.	.	.	1	.	.	.	3
1840	.	1	.	.	.	.	.	.	.	.	.	1	2
1841		.	1	.	.	.	.	.	1	.	.	.	2
1842		.	1	.	.	.	.	.	.	.	.	.	1
1843	1	.	2	1	.	.	.	.	1	.	1	.	6
Total.	66	87	99	61	9	0	2	28	98	97	74	61	682

III.

On the Periodicity of the Aurora Borealis.

BY JOSEPH LOVERING,

HOLLIS PROFESSOR OF MATHEMATICS AND NATURAL PHILOSOPHY IN HARVARD COLLEGE.

After my first catalogue, comprising nearly ten thousand independent auroras, had been printed, other materials came into my hands which rendered necessary a second catalogue, by which the aggregate of auroras was increased to nearly twelve thousand.[1] Having succeeded in obtaining from Europe a copy of Frobes's book, entitled *Nova et antiqua Luminis atque Aurorae Borealis Spectacula*, I was able, in this second catalogue, to give the places as well as the dates of most of the appearances which Mairan had quoted from this work. Also, by the kindness of Professor Argelander, I received a copy, in advance, of his *Verzeichniss von Nordlichtern etc., Abdruck aus den Abhandlungen der Finnischen Societät etc.*, containing observations of the aurora made at Åbo, Wasa, and Helsingfors, between 1823 and 1837. Professor G. T. Kingston has supplied me with the latest observations made at Toronto, and Professor Charles Smallwood with others made at the Isle Jesus, in Canada. Mr. Charles A. Schott has obtained for me, from the original records in possession of the Smithsonian Institution, the dates of one hundred and eight auroras observed, between the years 1807 and 1859, by the late Professor Parker Cleaveland, at Brunswick, Maine. General Lefroy, formerly Director of the Magnetic Observatory in Toronto, Canada, has placed at my disposal his large accumulation of observations on the aurora, collected in British America, particularly during the years 1848–1853. Also, Professor Joseph Henry, Secretary of the Smithsonian Institution, has given me free access to the unpublished records of meteorology, made, for a short period, in various parts of the United States, under the auspices of this Institution, and in accordance with the comprehensive plan of its Secretary. I have availed myself of the opportunity, afforded by a recent visit to Holland, to search for the manuscript records of meteorology kept by Musschenbroek at Utrecht and Leyden. In this attempt I was heartily seconded by M. le Directeur de l'Institut Royal Météorologique des

[1] Those auroras marked by a *star*, in the second catalogue, are also contained in the first catalogue.

Pays-Bas, Buys Ballot. After I had found these manuscripts in the library of the University of Leyden, every facility for consulting them was kindly granted by the librarian, Dr. W. G. Pluygers, and by his assistant in charge of the manuscripts, W. N. du Rieu. From this source I have gathered the observations made in Holland on seven hundred and eighty-four auroras, most of which have never been published before. The observations on the aurora in Holland, in Brunswick, Maine, etc., are printed here as a supplement to my second catalogue of auroras.

SUPPLEMENTARY CATALOGUE.

I. *Observations on the Aurora, made by Musschenbroek, at Utrecht, etc.*

1728. Feb. 7°, 9°, 11°, 13°; March 20°, 30°; April 2°, 9°, 12°; Aug. 31°; Sept. 30°; Oct. 2°, 7°, 12°, 29°, 30°; Nov. 2°, 23°.

1729. March 27°, 28°; Oct. 21°; Nov. 16°.

1730. Feb. 15°; March 6°; April 13°; Sept. 10°; Nov. 5°, 6.

1731. March 7°; April 3°, 13; May 14°; Oct. 2°, 3°, 7°, 8°, 23°; Nov. 6°, 30°.

1732. Feb. 18°; March 21°, 27°; May 27, 28, 30; Aug. 22°; Sept. 27°; Oct. 22°, 23°; Nov. 10, 12°, 19, 20°, 21.

1733. April 18, 19°; May 4, 7, 16°, 17; Sept. 5, 6°; Oct. 10°, 15; Nov. 7°; Dec. 23.

1734. Feb. 3; March 22; April 7°, 8°, 9°; May 1°, 4°, 5°, 6°, 24°, 25°, 26°, 27°, 28°, 29°, 30°, 31°; June 1, 2, 4, 5, 7, 24°; July 5°, 6, 7°; Aug. 3, 7°, 9; Sept. 5, 10, 21°, 25°, 27°, 29°; Oct. 1°, 2°, 5°, 6°, 14°; Dec. 19°, 25°.

1735. Jan. 23, 26°; Feb. 11, 22°, 23; March 1, 2°, 16, 17, 19, 22°, 23°, 24°, 25°, 26°, 27, 28, 29, 30 (dubia); April 20° (from 8^h to 9^h), 22° (clara: from 11 P. M. to 1, coruscans), 23° (clara); May 14, 17, 18, 19, 22; June 9, 10, 11, 13, 14; July 2, 3, 8, 10, 17; Oct. 24°; Nov. 10, 11, 14°; Dec. 11, 21.

1736. Jan. 22°, 31 (tranquilla); Feb. 2 (placida in nubibus); March 3 (exigua), 15°; April 3° (placida), 5°, 11 (placida), 14° (placida), 27; May 4° (clara), 5 (exigua), 6 (placida), 11 (placida), 14 (magna, tranquilla), 15 (placida), 27 (placida); June 1, 2 (magna), 23 (magna), 24 (magna), 29 (magna), 30; July 25; Aug. 13°; Sept. 3°, 5° (placida), 9° (coruscans), 25° (placida), 27°, 28, 29° (magna, placida); Oct. 1° 4°?, 6° (exigua, placida), 7° (magna), 10° (magna, tranquilla), 11, 12, 20°, 25°, 26° (magna), 27° (maxima), 28° (exigua), 29°, 30° (obscura), 31; Nov. 1 (obscura), 7°, 8° (maxima), 10 (levis), 11, 12, 18°, 20, 21, 24°, 25°, 26; Dec. 6, 15, 18° (magna, coruscans), 29, 30.

1737. Jan. 4, 19°, 29°, 30°, 31°; Feb. 2°, 20, 28°; March 1, 4 (inconstans caelum), 8; May 3; June 4, 5, 17, 18, 23, 24; July 26 (tranquilla); Aug. 21° (magna, coruscans), 22° (magna), 26 (exigua), 27, 28; Sept. 17, 19 (placida); Oct. 1°; 17, 18, 30; Nov. 19, 20; Dec. 5°, 15 (caeli rubido), 16°,[1] 18, 26, 28°.

1738. Jan. 25° (magna, coruscans), 26; Feb. 8 (exigua), 9, 12°, 18 (magna), 19° 24, 26 (placida); March

[1] Die 16° vesperi totum caelum rubicundum et lucidum fuit ab hora 6 ad 11 et ultra; postea, novellis publicis vidi in plurimis Europae locis Auroram Borealem observatam.

11, 17, 18•. 21•, 22, 23, 26; April 13, 18, 21 (et Australis), 28; May 9, 12 (placida), 13, 15 (magna, placida); June 5, 8, 16, 17, 23; July 10, 15 (magna), 16, 21; Aug. 7; Sept. 16 (tranquilla); Oct. 6, 12•, 17, 18; Nov. 4• (magna, placida, ab hora 5), 7•; Dec. 31.

1739. Jan. 18; Feb. 1•; March 11•, 12•, 13•, 20, 28, 29• (maxima);[1] April 5• (exigua), 14, 15, 19, 29• (placida sed magna); May 1•, 2•, 3, 4•, 5 (magna), 6, 8, 9, 10, 11, 12; June 2• (magna, coruscans), 5, 23 (tenuis); July 6 (placida, magna), 7, 12, 15, 28, 31; Aug. 1, 6, 7, 10•, 12•, 13, 28; Sept. 1 (tenuis), 8•, 10, 23• (magna), 24• (coruscans), 28•; Oct. 3• (parva), 9 (magna, placida), 24• (magna, coruscans), 25• (magna); Nov. 21.

1740. Jan. 30•; March 23•.

1741. Jan. 20•, 21•, 22, 23• (coruscans, magna);[2] Feb. 3, 6, 16•; March 11•, 12•, 13•, 16• (magna), 29 (meridionalis);[3] April 9•, 13•, 16•, 30; May 7, 8, 9, 10, 12, 15, 18, 30; Aug. 10• (coruscans), 13•, 20• (magna, coruscans), 22•, 31; Sept. 1, 3, 4, 12 (coruscans), 19•, 20; Oct. 2• (coruscans), 8•, 13• (placida), 14•, 15• (coruscans), 28•; Nov. 2•, 12•, 28.

1742. Jan. 13, 14, 23, 29•; Feb. 12, 13; March 13•, 28; April 2•, 3, 8, 10•, 24, 29, 30; Oct. 27• (magna); Dec. 28.

1743. Jan. 1, 3•, 19; March 19• (magna, corusca), 20•, 24•, 26•, 30; Aug. 9, 12; Sept. 8, 9, 18•; Oct. 7•.

1744. April 2•, 5, 13, 17; May 5, 16, 27; July 16, 17.

1745. Jan. 10; Feb. 4, 8; April 18, 19, 28; May 19, 30; Aug. 2.

1746. Jan. 26; Feb. 26•; March 19, 25• (magna), 26; April 14, 17, 18, 20, 21; May 7, 12 (magna), 16 (magna), 17, 26; July 14, 20, 22; Aug. 20, 21, 25; Oct. 22.

1747. Jan. 6•, 8•, 9•, 10•, 11; Feb. 1, 7•, 16; April 2• (magna), 3•, 5, 9, 10, 13, 29, 30; May 2; July 18; Aug. 4, 8; Sept. 6, 10•, 13, 14, 27•; Oct. 1, 2•, 3, 5, 9•; Nov. 28; Dec. 3•, 17• (magna), 18•, 22, 27 (magna).

1748. Jan. 6•, 7, 20, 29; Feb. 3•, 27•; March 3, 5; April 24, 26; May 1•, 2, 12, 21; June 3•; July 17, 22; Aug. 1; Sept. 11•, 23•; Oct. 12; Dec. 16•, 18•, 24•.

1749. Jan. 10, 18, 23; Feb. 11•; March 6, 7, 11•, 28•; April 22; May 10•; July 8, 9, 11, 12; Aug. 15, 20; Sept. 22•; Nov. 16.

1750. Jan. 3, 6• (magna); Feb. 3•[4] (magna), 7•, 12, 27• (magna); March 4• (placida), 9•, 11•; April 5,

[1] Die 29° per totam noctem coruscavit Aurora Borealis, expansa per universum caelum, aeque in parte australe quam boreale, cum columnis subinde ruberrimis, diu perstantibus, praecipue australibus: illuminabat vehementer terram, veluti luna dividua illuminare solet: atrae interruptae nubes in plaga boreale caeli: super has lux candidior erat.

[2] Die 23°, noctu, magna, coruscans Aurora Borealis elabitur in plaga orientali, et extenta usque ad austrum; non vero in septentrionali plaga aliquid lucentis phaenomeni conspectum fuit; quatuor se exequentibus noctibus fulsit Aurora Borealis, sed placida fuit tribus primis noctibus, donec quarta nocte ardere visa fuerit, columnasque jaculari ingentes.

[3] Sed die 29°, fuit Aurora meridionalis in plaga solstitii Aestivi orientalis usque ad meridiem. Luna fere erat plena, et fulgebat clare in caelo: hinc videri non potuisset nisi fuisset coruscans. Sed locus sub illa prope horizontem clarissima luce micabat. Pars caeli borea lucis hujus omnino expers fuit.

[4] Mense Februario fulserunt quatuor Aurorae Boreales magnae: praecipue die 3°, quae admodum rubra et coruscans: verum 27° die, hora 9½ vespertina, erat insignis, quae totam plagam caeli boream occupabat, quamvis non vibrans columnas. Quod singulare in ea, distabat ab aurora tractus longus lucidus, ab horizonte ortivo ad occasum extensus, non majori sub latitudine quam arcus caelestis, transiens inter Ursam Majorem et Orionem, ferebatur lente ad austrum, quia spirabat corus, postea hinc inde inflectebatur, instar serpentis, mox a vento frangebatur in partes: hora 10¼ jam erat lumen mutatum, propulsum ad austrum, atque a materie nubis borealis magna copia expulsa ad austrum fuit, adeo ut caelum ab omni parte lumine boreo impleri coeperit: hic tractus cumulabatur in trabem, quae caeli fornicem sustentaret:

8· (magna), 25, 26, 28; May 1· (coruscans), 2· (tenuis), 3, 4 (tenuis), 6, 7, 8 (tenuis), 22, 23; June 2;[1] July 26· (coruscans), 27 (coruscans); Aug. 4, 5, 26;[2] Sept. 2 (aurora australis), 7, 9; Dec. 14·, 26.

1751. Jan. 3, 4, 24; March 1, 2, 9 (magna), 15, 16, 17·, 19, 21, 31; April 2·, 19, 21; May 22; Sept. 11, 15 (tenuis), 28; Oct. 19; Dec. 24.

1752. Jan. 9· (sparsa, placida); March 2, 7·, 18·, 21, 22; April 3, 7 (tenuis), 14, 17 (magna), 18, 21, 26; May 9, 10, 13, 15, 16; Aug. 7, 10, 12·, 29, 31; Oct. 3· (coruscans), 5· (coruscans), 12·, 13· (magna), 14·; Nov. 10·, 11·, 13, 28·; Dec. 5·.

1753. Jan. 2; April 7, 24, 27; May 1, 2, 3, 4, 23; Aug. 27, 31; Sept. 22, 27; Nov. 28; Dec. 30, 31.

1754. Jan. 11, 19, 22, 26, 27, 31; Feb. 14, 15, 19, 21, 23, 24·, 27; March 18·, 21, 24 (magna), 25· (tenuis); April 12, 15, 16, 18, 19, 23, 28; May 8, 9, 16, 17; July 23; Aug. 14, 17, 19, 22, 23; Sept. 21, 24; Oct. 12, 16·; Nov. 14; Dec. 14, 18, 19.

1755. Jan. 15; April 11, 12, 13, 14, 15; May 4, 5, 7, 15; July 15; Aug. 15, 17; Sept. 29; Oct. 3, 10, 14; Nov. 6, 7, 9; Dec. 20, 29.

1756. Jan. 20; Feb. 5; March 24; April 1, 30; May 4, 7, 20; July 17; Aug. 1; Sept. 14·, 17 (magna), 24 (parva), 29·; Oct. 12, 26, 30; Nov. 18, 20·; Dec. 1, 24, 25.

1757. Feb. 10, 19, 20, 23; March 10 (pulchra), 11 (magna), 17, 20, 25, 26, 27 (levis), 28; April 14, 18, 21, 23, 30; May 13, 15, 16; Aug. 9, 12, 15, 16, 19; Sept. 1, 2, 16· (coruscans), 18; Nov. 12·, 17.

1758. Jan. 7, 8·, 9 (parva), 10 (coruscans); Feb. 2, 12, 13, 14, 25; March 13, 14, 29, 30; April 13; May 2, 9, 10, 11; July 27, 28, 29, 30.

II. *Auroras observed at Haarlem.*[3]

1735. March 20·, 23·; April 23·; July 17; Aug. 6, 9, 12, 19, 20·, 21, 23·.

III. *Observations on the Aurora, made by Professor Parker Cleaveland, at Brunswick, Maine.*

1807. Nov. 20 (at 8 o'clock), 28 (faint).

1808. Jan. 30 (bright); Feb. 18 (bright), 24, 25; March 19, 23, 25, 26; April 14, 22, 23; June 25.

1814. April 17· (brilliant, from 8^h P. M. to midnight. At 8^h 30^m an irregular arc, about 30° above the horizon, from which brilliant coruscations ascend to the zenith. A spot in the zenith detached and radiating in all directions); Sept. 11· (through most of the night), 12 (less brilliant).

1815. March 8; April 12.

1816. Sept. 24· (arch and radii).

1817. Feb. 8· (in evening: vertex 30° high), 27 (in spots); Oct. 13 (at 9 o'clock, low arc).

1818. Aug. 4; Sept. 20· (bright: two extensive streamers), 21, 26· (bright); Oct. 1·, 5, 19, 22.

ejus materia erat in marginibus rarissima, in medio densior et fulgentior, nonnunquam cum motu tremulo, verum omnes stellae fixae per lumen spectari potuerunt.

[1] Mense Junio, die 2°, Aurora Borealis erat toto caelo conspicua, fornix nigra et obscura, ab horizonte non procul caelum nitebat et ardebat in rotundum, praecipue plaga orientalis, septentrionalis, et occidentalis.

[2] Mense Augusto, die 26°, Aurora Borealis coruscans fuit cum multis columnis ab hora $9\frac{1}{2}$ ad 10 nocturnam; die 2°, hora $8\frac{1}{2}$, bolis valde nitens fuit.

[3] These were found recorded in the manuscripts of Musschenbroek.

1819. March 28; Sept. 22 (bright from 11^h P. M. to 12^h); Oct. 11 (at 11^h P. M.), 12· (very bright from 8^h to 11^h P. M.).

1820. April 3· (semicircular, from E. to W.).

1821. Nov. 26·.

1823. Feb. 6, 7.

1827. Aug. 27· (bright), 28· (extremely bright and extensive); Sept. 8· (bright), 25 (singular, of a red color, extending to the south and around); Oct. 6·, 10·, 16·, 18·.

1828. Aug. 15 (bright); Dec. 27.

1829. Jan. 3· (bright); Feb. 4 (bright); Sept. 18·, 19·; Dec. 19· (splendid), 22· (splendid bow), 28·.

1830. Feb. 18· (splendid, and an arc), 21; March 4, 29; May 15· (splendid); Aug. 13· (a light bow), 14; Sept. 16·; Oct. 17·.

1831. March 3·, 8· (brilliant, and a bow).

1833. July 9; Sept. 5· (arc from N. W. to S. E., beautiful), 13· (arch 30°), 14 (arch 10°).

1835. Nov. 16 (rays brilliant after sunset).

1836. July 7 (N. E. to S. W.), 15 (N. E. to S. W.).

1837. Jan. 25· (splendid, extending from N. W. to S. E. in the form of a rainbow. Stars shot forth. It continued some hours, giving the whole earth a red appearance); April 6· (splendid, in evening).

1838. Feb. 21· (bright in evening), 28 (in evening); Sept. 13· (arc), 14· (streamers. Arc from E. to W.), 15· (streamers), 16· (some streamers), 20·; Nov. 12· (very brilliant in E.), 14· (arc); Dec. 20·.

1839. Jan. 14· (very beautiful, from N. W. to S. E.); April 21·; May 10·; Aug. 15 (brilliant, N. W. to E.: in evening), 29· (beautiful in N.: evening), 31· (in the evening appeared in N. and N. E. some beautiful auroras); Sept. 4· (most brilliant colors), 5 (brilliant again); Oct. 10· (beautiful), 11· (beautiful).

1840. Jan. 3· (brilliant), 4· (brilliant), 6 (brilliant); Feb. 24·.

1848. Oct. 23· (brilliant), 25· (brilliant), 26·, 27·, 28·; Nov. 17· (brilliant and partly bright red).

1849. Nov. 27· (splendid, a red appearance).

1857. Sept. 3·.

IV. *Observations on the Aurora, made by Lieutenant C. J. B. Riddell and Captain J. H. Lefroy, at Toronto, Canada.*[1]

1840. Jan. 3·, 31·; Feb. 7·, 8, 28·; March 5·, 6·, 21·, 25·; April 1·, 4·; May 27·, 28?·, 29·; Aug. 19·, 21·, 23·, 24·, 25·, 28·; Sept. 2·, 16·, 17, 20, 21·, 25·, 27·; Oct. 19·, 22·, 31·; Nov. 13·; Dec. 20·, 23·, 28·.

1841. Jan. 9, 18·, 24·, 25·, 27·; Feb. 11·, 12·, 15·, 23·, 24·; March 11·, 14·; April 13, 18·, 19·, 21·, 26; May 26·; June 15·; July 6·, 14, 15, 19·, 21·, 24·, 28·, 30; Aug. 6, 11, 14, 22, 23; Sept. 12·, 13·, 25·; Oct. 7·, 8·, 9·, 13·, 15·, 24·; Nov. 4, 5·, 8·, 18·; Dec. 14·, 17·.

1842. Jan. 10, 15·, 29; April 10·, 11·, 14·, 15·; June 4·, 14; July 2?·, 3·, 9·, 11·, 14, 31·; Aug. 5·; Sept. 1, 2·, 13·, 15·, 16·, 28·; Dec. 5·.

1843. March 5·, 6·; April 5·, 6·; June 30·; July 2·, 7·, 25·, 26; Aug. 3·; Sept. 18·, 20·, 21·, 27·, 29·; Oct. 19·; Dec. 11·.

1844. Jan. 24·, 28·; March 2·, 7·, 9·; April 16·, 18·; May 7·, 8·, 14·, 22·; June 20·; July 8·; Aug. 9·, 29·; Sept. 14·, 19·, 30?·; Oct. 20·; Nov. 13·, 16·?.

[1] From the manuscripts of Captain (now General) Lefroy.

1845. Jan. 9•; Feb. 24•; March 12•, 13•; April 13•, 28; June 30•; July 5•, 8•, 24•; Aug. 1•, 2•; Sept. 3•, 7•, 24•, 25•, 26•; Oct. 9•, 20•; Nov. 27•.

1846. Jan. 23•; Feb. 25•; March 17•; April 2, 15•, 19•; May 3•, 4•, 11•, 18•, 19•, 24, 30•, 31•; July 1, 14, 19, 20•, 24•, 30, 31•; Aug. 12•, 13•, 14•, 16•, 24•, 25•, 26, 28•; Sept. 11•, 12•, 16•, 21•, 22•, 23•, 27•; Oct. 2•, 9•, 11•, 19•, 24•; Nov. 30•; Dec. 23•.

1847. Feb. 22•; March 4•, 18•, 19•, 24, 31; April 3•, 7•, 8•, 19•; May 7•; June 12•, 13; July 9•, 11•, 22; Aug. 4•, 16•, 21•, 22•; Sept. 27•; Oct. 8•, 12•, 14•, 15•, 22•, 23•; Nov. 2•, 3•, 5•, 9•, 22•, 25•, 26•; Dec. 8•, 16•, 17•, 19•.

1850. Jan. 9•, 13•, 18•, 19•; Feb. 5•, 9•, 11•, 12•; March 4•, 16•, 24•, 31•; April 1•, 5•, 6•, 8•, 9•, 11•, 15•, 16•, 18•; May 7•, 8•, 9•, 12•, 13•; June 30•; July 3•, 9•, 10•, 11•, 15•, 29•; Aug. 1•, 2•, 9•, 10•, 15•, 16•, 17•; Sept. 2•, 3•, 7•, 10•, 29•, 30•; Oct. 1•, 2•, 5•, 6•, 13•, 25•, 27•, 28•, 29•, 30•; Nov. 8•, 10•, 29•; Dec. 27•.

1851. Jan. 26•; Feb. 5•, 18•, 28•; March 2•, 7•, 11•, 22•, 28•, 29•, 31•; April 3•, 28•; May 4•, 7•, 17•; June 5•, 13•, 26•, 27•; July 2•, 14•, 17•, 18•, 26•; Aug. 5•, 20•, 24•, 26•, 29•, 30•, 31•; Sept. 2•, 3•, 6•, 7•, 12, 15•, 16•, 29•, 30•; Oct. 1•, 2•, 3•, 4•, 18•, 20•, 21•, 22•, 23•, 26•; Nov. 3•, 12•, 15•, 17•, 18•, 23•, 24•, 29•, 30•; Dec. 1•, 4•, 6•, 12•, 13•, 18•, 19•, 21•, 23•, 25•, 28•, 29•.

1852. Jan 13•?, 19•, 21•, 22•, 23•, 24•, 26•; Feb. 1•, 13•, 15•, 16•, 18•, 19•, 20•, 23•; March 10•.

V. *Observations on the Aurora, made by Professor Charles Smallwood, at St. Martin, Isle Jesus, Canada.*

1852.[1] Jan. 19•, 26•; Feb. 15•, 19•, 20•; March 7•, 19•, 20•; May 5•, 6•, 18•; June 11•, 15•, 23; July 5•, 6•, 7•, 10•, 20, 29•; Aug. 5•, 6•, 10•, 11•; Sept. 3•, 4•, 16•, 17•, 18•, 29•; Oct. 6•, 19•, 20•; Nov. 11•; Dec. 1•, 29•.

1856.[2] Jan. 27, 31•; Feb. 9, 24, 26; March 3•, 4•, 6•, 8•, 23; April 10, 23; May 1, 5; June 5; July 1, 24; Aug. 17, 22•, 31•; Sept. 1•, 8•, 24, 27; Oct. 4•, 23•, 24, 25, 26; Nov. 5, 20•; Dec. 20, 28•, 29•.

1857. Feb. 26•, 28; March 1, 17•; April 15; May 3, 13•; June 4, 24; July 11•; Aug. 26•; Sept. 3•, 10•, 23•, 25•, 30; Oct. 23•, 24•; Dec. 4•, 8, 20•.

1858. Jan. 5, 8•, 10•, 13•, 17•; Feb. 17•; March 3•, 12•, 13•, 31•; April 3•, 8, 10•, 11•, 16; May 7•, 9• 16; June 11; Aug. 2, 11, 12, 16•, 26, 31•; Sept. 1•, 7•, 10•, 11, 18, 20•, 22•; Oct. 10•, 11, 18•, 27•, 28•; Dec. 1•, 11, 24•, 29•.

VI. *Observations on the Aurora, made by Professor Charles Smallwood, at Montreal, Canada.*

1862.[2] Jan. 2•, 3, 13•, 24•; Feb. 1•, 20•; March 2, 19•, 26•; April 1•, 28; May 2•, 6•, 30•; Aug. 4•, 8•, 13•, 18•, 19•, 28•, 29•; Sept. 2•, 3•, 9•, 24•, 25•, 26•, 27•, 28•.

1863. Feb. 8•, 9•, 27; March 9; Aug. 25; Oct. 9•; Dec. 30.

1864. April 3, 4•, 24•; May 2, 9; June 7•; Aug. 27, 31•; Sept. 7, 17; Oct. 19•, 24•.

1865. Jan. 16•, 17•; Sept. 16•, 28•; Oct. 10•.

1866. April 5, 6, 7•, 9, 17•; Sept. 13•; Oct. 3•, 4•; Dec. 10•.

1867. March 6, 10, 16, 17; May 31•.

1868. March 22; April 13•; May 11; Sept. 5; Oct. 6.

1869. Feb. 5; June 4; Sept. 5; Oct. 31.

[1] Amer. Journ. Sci., N. S., XVI. 78.

[2] From the manuscript records of Professor Smallwood.

LXIII. AURORAS OBSERVED IN HOLLAND, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1728	.	4	2	3	.	.	.	1	1	5	2	.	18
1729	.	.	2	.	.	.	.	.	.	1	1	.	4
1730	.	1	1	1	.	.	.	.	1	.	2	.	6
1731	.	.	1	2	1	.	.	.	.	5	2	.	11
1732	.	1	2	.	3	.	.	1	1	2	5	.	15
1733	.	.	.	2	4	.	.	.	2	2	1	1	12
1734	.	1	1	3	12	6	3	3	6	5	.	2	42
1735	2	3	14	3	5	5	5	.	.	1	3	2	43
1736	2	1	2	5	7	6	1	1	7	15	12	5	64
1737	5	3	3	.	1	6	1	5	2	4	2	6	38
1738	2	7	7	4	4	5	4	1	1	4	2	1	42
1739	1	1	6	5	11	3	6	7	6	4	1	.	51
1740	1	.	1	.	.	.	.	.	.	.	.	.	2
1741	4	3	5	4	8	.	.	5	6	6	3	.	44
1742	4	2	2	7	.	.	.	.	.	1	.	1	17
1743	3	.	5	.	.	.	.	2	3	1	.	.	14
1744	.	.	.	4	3	.	2	.	.	.	.	.	9
1745	1	2	.	3	2	.	.	1	.	.	.	.	9
1746	1	1	3	5	5	.	3	3	.	1	.	.	22
1747	5	3	.	8	1	.	1	2	5	5	1	5	36
1748	4	2	2	2	4	1	2	1	2	1	.	3	24
1749	3	1	4	1	1	.	4	2	1	.	1	.	18
1750	2	4	3	5	9	1	2	3	3	.	.	2	34
1751	3	.	9	3	1	.	.	.	3	1	.	1	21
1752	1	.	5	7	5	.	.	5	.	5	4	1	33
1753	1	.	.	3	5	.	.	2	2	.	1	2	16
1754	6	7	4	7	4	.	1	5	2	2	1	3	42
1755	1	.	.	5	4	.	1	2	1	3	3	2	22
1756	1	1	1	2	3	.	1	1	4	3	2	3	22
1757	.	4	8	5	3	.	5	4	.	2	.	.	31
1758	4	5	4	1	4	.	4	.	.	.	.	.	22
Total	57	57	97	100	110	33	46	57	59	79	49	40	784

LXIV. AURORAS OBSERVED AT THE HAGUE, ARRANGED BY YEARS AND MONTHS.[1]

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1745	.	.	1	.	.	.	.	.	.	.	.	.	1
1746	.	2	1	1	.	.	1	.	.	1	2	.	8
1747	2	.	.	4	2	.	.	.	1	.	.	1	10
1748	.	1	.	.	.	.	4	1	.	.	.	4	10
1749	2	.	.	.	.	.	.	1	.	.	.	.	3
1750	1	2	4	1	.	.	.	1	2	.	.	1	12
1751	1	3	2	.	.	.	.	2	1	.	.	.	9
1752	1	.	1	.	.	.	.	.	1	7	.	3	13
1753	.	.	.	2	.	.	.	.	1	.	.	1	4
1754	.	.	1	.	.	.	.	1	.	2	.	.	4
1755	.	.	.	1	.	.	.	.	2	.	.	1	4
1756	.	.	.	.	.	.	.	.	.	.	.	.	8
1757	.	2	1	1	.	.	1	.	.	1-	2	.	8
1758	.	.	.	.	.	.	.	.	.	.	.	.	10
Total	7	10	11	10	2	0	6	6	8	11	4	11	104

[1] Observed by Peter Gabry, and found in the manuscripts of Musschenbroek.

LXV. AURORAS OBSERVED AT BRUNSWICK, ME., ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1807	.	.	.	.	.	.	.	.	.	.	2	.	2
1808	1	3	4	3	.	1	.	.	.	.	.	.	12
1814	.	.	.	1	.	.	.	.	2	.	.	.	3
1815	.	.	1	1	.	.	.	.	.	.	.	.	2
1816	.	.	.	.	.	.	.	.	1	.	.	.	1
1817	.	2	.	.	.	.	.	.	.	1	.	.	3
1818	.	.	.	.	.	.	.	1	3	4	.	.	8
1819	.	.	1	.	.	.	.	.	1	2	.	.	4
1820	.	.	.	1	.	.	.	.	.	.	.	.	1
1821	.	.	.	.	.	.	.	.	.	.	1	.	1
1823	.	2	.	.	.	.	.	.	.	.	.	.	2
1827	.	.	.	.	.	.	.	2	2	4	.	.	8
1828	.	.	.	.	.	.	.	1	.	.	.	1	2
1829	1	1	.	.	.	.	.	.	2	.	.	3	7
1830	.	2	2	.	1	.	.	2	1	1	.	.	9
1831	.	.	2	.	.	.	.	.	.	.	.	.	2
1833	.	.	.	.	.	.	1	.	3	.	.	.	4
1835	.	.	.	.	.	.	.	.	.	.	1	.	1
1836	.	.	.	.	.	.	2	.	.	.	.	.	2
1837	1	.	.	1	.	.	.	.	.	.	.	.	2
1838	.	2	.	.	.	.	.	.	5	.	2	1	10
1839	1	.	.	1	1	.	.	3	2	2	.	.	10
1840	3	1	.	.	.	.	.	.	.	.	.	.	4
1848	.	.	.	.	.	.	.	.	.	5	1	.	6
1849	.	.	.	.	.	.	.	.	.	.	1	.	1
1857	.	.	.	.	.	.	.	.	1	.	.	.	1
Total	7	13	10	8	2	1	3	9	23	19	8	5	108

LXVI. AURORAS OBSERVED AT SITKA, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1842	.	.	4	1	.	.	1	.	1	.	1	.	8
1843	.	1	.	1	.	.	.	.	1	2	.	.	5
1844	.	.	2	1	.	.	.	.	2	1	1	.	7
1845	2	.	1	1	.	.	.	1	.	.	.	.	5
1847	.	.	.	.	1	.	.	4	2	.	4	2	13
1848	.	1	.	.	.	.	.	.	.	.	.	.	1
1849	.	.	.	.	.	.	.	.	1	.	2	1	4
1850	.	.	1	1	.	.	.	1	2	1	.	2	8
1852	1	1	2	.	.	.	.	.	.	.	1	4	9
1856	.	.	.	1	.	.	.	1	.	.	.	2	4
1857	.	.	.	1	.	.	.	.	1	1	.	.	3
1858	.	3	4	.	1	.	.	1	.	2	1	4	16
1859	.	2	1	1	.	.	.	1	.	3	2	1	11
1860	.	.	2	.	.	.	.	.	1	.	.	.	3
1861	.	.	.	1	.	.	.	.	.	.	.	.	1
1863	.	.	1	.	.	.	.	1	1	.	.	.	3
1864	.	.	.	2	.	.	.	1	.	.	.	.	3
Total	3	8	18	11	2	0	1	11	12	10	12	16	104

LXVII. AURORAS OBSERVED AT ST. MARTIN, CANADA, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1852	2	3	3	.	3	3	6	4	6	3	1	2	36
1853	2	4	1	4	4	2	7	3	6	1	2	3	39
1854	4	5	6	5	5	2	7	3	8	2	.	3	50
1855	1	2	5	4	4	.	3	4	2	3	5	4	37
1856	2	3	5	2	2	1	2	3	4	5	2	3	34
1857	.	2	2	1	2	2	1	1	5	2	.	3	21
1858	5	1	4	5	3	1	.	6	7	5	.	4	41
1859	3	5	7	6	2	.	2	4	5	4	.	3	41
1860	1	4	8	4	1	.	3	10	5	4	1	1	42
1861	2	2	5	6	.	1	3	4	5	4	2	2	36
1862	3	1	2	1	2	.	.	6	7	1	1	2	26
Total	25	32	48	38	28	12	34	48	60	34	14	30	403

LXVIII. AURORAS OBSERVED IN PARIS, FRANCE, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1710	.	.	.	.	.	.	.	.	1	.	.	.	1
1716	.	.	.	3	.	.	.	.	.	.	.	2	5
1717	4	.	.	4	.	.	.	.	.	.	.	.	8
1719	.	.	1	1	.	.	.	.	.	.	.	.	2
1720	.	3	.	.	.	.	.	1	1	.	1	.	6
1729	.	.	.	.	1	2	.	.	2	2	.	1	8
1730	.	1	1	2	.	1	.	.	1	3	.	.	9
1731	.	.	.	.	.	.	.	.	4?	1	.	.	5?
1732	1	.	3	7	3	1	1	2	3	16	3	1	41
1733	1	2	.	2	4	.	2	4	1	.	3	.	19
1734	1	3	2	3	1	.	1	2	2	8	4	1	28
1736	.	.	.	.	.	.	.	.	.	.	.	1	1
1750	.	1	.	.	.	.	.	.	.	.	.	.	1
1762	.	.	.	.	2	.	.	.	.	.	.	.	2
1765	.	.	.	.	.	.	.	.	.	1	.	.	1
1768	.	.	.	.	.	.	.	1	.	1	.	1	3
1769	.	1	.	.	.	.	.	.	1	1	.	.	3
1770	.	.	.	.	.	.	.	1	.	.	.	.	1
1771	.	.	1	.	.	.	.	.	.	.	.	.	1
1773	.	.	.	.	.	.	.	.	1	.	.	.	1
1777	.	1	.	.	.	.	.	.	1	.	1	.	3
1781	.	.	.	.	.	.	.	.	1	.	.	.	1
1783	.	.	.	2	.	.	.	.	.	.	.	.	2
Total	7	12	8	24	11	4	4	11	19	33	12	7	152
1784–1842	4	5	12	4	20	5	6	10	13	13	10	6	108
Total	11	17	20	28	31	9	10	21	32	46	22	13	260

LXIX. AURORAS OBSERVED IN THE UNITED STATES OF AMERICA, ARRANGED BY YEARS AND MONTHS.

Maine.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1849	.	.	2	4	7	3	3	1	8	3	1	3	35
1850	2	2	9	4	4	.	1	2	1	1	.	.	26
1851	.	1	.	.	.	.	.	.	3	2	.	.	6
Total	2	3	11	8	11	3	4	3	12	6	1	3	67

Vermont.

1849	.	.	1	.	2	.	1	4	4	4	2	2	20
1850	.	1	3	4	1	.	2	2	2	4	3	.	22
1851	.	4	.	1	.	1	.	.	3	3	.	.	12
Total	0	5	4	5	3	1	3	6	9	11	5	2	54

Massachusetts.

1849	.	.	.	.	1	.	2	.	3	3	.	1	10
1850	.	.	3	2	1	.	2	.	.	4	.	.	12
1851	3	1	1	.	.	1	.	.	2	.	.	.	8
Total	3	1	4	2	2	1	4	0	5	7	0	1	30

Connecticut.

1849	.	.	1	2	1	.	2	.	.	2	.	.	8
1850	1	2	5	3	1	2	1	1	.	3	1	.	20
1851	.	2	.	.	4	1	.	.	1	1	.	.	9
Total	1	4	6	5	6	3	3	1	1	6	1	0	37

New Hampshire.

1849	.	.	2	.	1	.	.	.	3	1	.	1	8
1850	.	.	1	2	1	.	3	.	.	1	.	1	9
1851	.	1	.	.	.	2	1	1	4	3	.	.	12
Total	0	1	3	2	2	2	4	1	7	5	0	2	29

New York.

1849	.	.	1	.	.	.	.	.	.	.	.	.	1
1850	2	4	6	4	.	3	4?	1	2	3	1	1	31
1851	.	6	2	.	1	2	1	1	4	1	.	.	18
Total	2	10	9	4	1	5	5?	2	6	4	1	1	50

Pennsylvania.

1849	.	.	4	4	2	4	5	2	7	2	1	1	32
1850	5	4	4	8	2	3	4?	7	3	5	3	1	49
1851	2	3	9	4	4	.	.	1	1	.	.	.	24
Total	7	7	17	16	8	7	9?	10	11	7	4	2	105

Ohio.

1849	.	.	4	4	.	.	1	.	.	.	1	.	10
1850	1	.	.	.	.	.	1	.	.	.	.	.	2
1851	.	.	.	.	1	.	.	.	1	.	.	.	2
Total	1	0	4	4	1	0	2	0	1	0	1	0	14

LXX. AURORAS OBSERVED IN THE UNITED STATES, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Illinois.													
1849	.	.	.	1	.	2	.	.	.	.	.	.	3
1850	1	.	1	1	.	2	.	.	.	.	.	.	5
1851	.	1	.	.	.	.	.	.	3	.	.	.	4
Total	1	1	1	2	0	4	0	0	3	0	0	0	12
Indiana.													
1849	.	.	1	.	.	1	.	.	.	.	.	.	2
1851	.	2	.	.	.	.	1	.	2	.	.	.	5
Total	0	2	1	0	0	1	1	0	2	0	0	0	7
Michigan.													
1849	.	.	7	2	5	.	4	.	2	3	1	.	24
1850	.	1	2	3	.	.	.	.	3	3	.	.	12
1851	3	1	.	.	1	.	.	3	4	.	.	.	12
Total	3	2	9	5	6	0	4	3	9	6	1	0	48
Iowa.													
1850	.	.	1	.	.	.	.	.	.	.	.	.	1
1851	.	.	.	1	.	.	.	.	1	1	.	.	3
Minnesota.													
1850	.	1	.	.	.	.	.	.	.	.	.	.	1
Wisconsin.													
1849	.	.	2	3	.	1	.	2	.	2	.	1	11
1850	.	.	3	2	.	.	.	2	2	2	.	.	11
1851	1	3	2	.	1	.	.	2	2	1	.	.	12
Total	1	3	7	5	1	1	0	6	4	5	0	1	34
New Jersey.													
1849	.	.	2	.	.	1	.	.	.	.	.	.	3
1850	.	.	.	2	1	.	.	.	.	2	.	.	5
1851	1	.	.	.	.	.	1	.	1	1	.	.	4
Total	1	0	2	2	1	1	1	0	1	3	0	0	12
Maryland.													
1849	.	.	1	.	.	.	.	.	.	.	.	.	1
1850	.	.	.	.	.	.	1	.	.	.	.	.	1
1851	.	1	.	.	1	.	.	.	1	.	.	.	3
Total	0	1	1	0	1	0	1	0	1	0	0	0	5
Washington, D. C.													
1849	.	.	1	.	.	.	.	.	.	.	.	.	1
1851	.	.	.	.	.	.	.	.	2	1	.	.	3
Total	0	0	1	0	0	0	0	0	2	1	0	0	4
Delaware.													
1849	.	.	.	.	.	.	.	.	1	1	.	.	2
Virginia.													
1849	.	.	.	.	.	.	.	.	1	.	.	.	1
1851	.	.	.	.	.	.	.	.	2	.	.	.	2
North Carolina.													
1851	.	.	.	.	.	.	.	.	1	.	.	.	1
South Carolina.													
1851	.	.	.	.	.	.	.	.	1	.	.	.	1
Tennessee.													
1851	.	.	.	.	.	.	.	.	1	.	.	.	1

LXXI. AURORAS OBSERVED IN BRITISH AMERICA, ARRANGED BY YEARS AND MONTHS.

Halifax.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1848	.	.	1	.	.	.	.	.	.	.	.	.	1
1849	1	5	2	8?	4	1?	3	1	3	3	.	.	31?
1850	1	4	6	4	3	5	8	9	8	8	2	2	60
1851	3	5	6	7	.	.	.	.	.	.	.	.	21
1852	4	9	8	4	4	2	9	2	4	1	1	.	48
Total	9	23	23	23	11	8	20	12	15	12	3	2	161

Montreal.[1]

1848	1	10	6	9	1	2	1	5	1	2	2	1	41
1849	1	3	1	5	1	2	2	1	5	4	1	1	27
1850	1	3	4	5	1	2	9	5	4	4	.	.	38
1851	.	4	4	1	.	2	1	1	5	2	.	2	22
1852	2	4	.	1	5	3	7	2	3	3	.	.	30
1862	4	2	3	2	3	.	.	7	8	.	.	.	29
1863	.	3	1	.	.	.	.	1	.	1	.	1	7
1864	.	.	.	3	2	1	.	2	2	2	.	.	12
1865	2	.	.	.	.	.	.	.	2	1	.	.	5
1866	.	.	.	5	.	.	.	.	1	2	.	1	9
1867	.	.	4	.	1	.	.	.	.	.	.	.	5
1868	.	.	1	1	1	.	.	.	1	1	.	.	5
1869	.	1	.	.	.	1	.	.	1	1	.	.	4

Kingston.

1850	.	4	1	3	.	.	6	3	5	5	1	.	28
1851	.	1	5	.	1	.	2	2	5	2	.	1	19
1852	2	6	4	4	5	6	7	.	2	4	.	.	40
Total	2	11	10	7	6	6	15	5	12	11	1	1	87

Quebec.

1848-51	6	25	14	24	7	10	13	10	19	21	13	7	169
1852	1	7	1	2	5	5	6	7	8	5	5	8	60
Total	7	32	15	26	12	15	19	17	27	26	18	15	229

Albion Mines.

1849	.	4	3	.	.	.	.	2	3	2	1	.	15
1850	1	2	4	3	4	.	4	1	6	1	1	.	27
1851	5	2	3	1	.	.	2	3	3	2	.	.	21
Total	6	8	10	4	4	0	6	6	12	5	2	0	63

Michipicoton.

1849	.	.	.	.	.	.	.	.	.	.	4	3	7
1850	3	4	3	7	1	6	4	2	1	2	2	2	37
1851	2	6	6	9	5	2	5	.	.	.	.	.	35

Moose Factory.

1850	.	.	.	.	.	6	18	17	12	13	9	13	88
1851	14	12	15	20	17	11	17	13	15	12	5	10	161
1852	18	12	15	.	.	.	.	.	.	.	.	.	45

[1] The series is imperfect. The auroras for 1848 and 1849 were taken from a printed circular of Captain Lefroy.

LXXII. AURORAS OBSERVED IN BRITISH AMERICA, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Fort Simpson.													
1849	.	.	.	.	.	.	.	.	.	2	3	3	8
1850	3	6	5	.	.	.	.	.	8	.	.	.	22
1851	.	.	.	.	.	.	.	.	.	13	11	18	42
1852	8	14	15	4	1	.	.	4	13	13	14	20	106
1853	15	17	22	21	.	.	.	.	.	.	.	.	75
Peel's River.													
1849	.	.	.	.	.	.	.	.	6	6	8	.	20
1851	10	15	9	4	4	.	.	.	.	.	11	19	72
1852	12	4	4	.	.	.	.	.	10	13	14	16	73
1853	20	16	.	.	.	.	.	.	.	.	.	.	36
Fort George.													
1852	.	.	.	.	.	.	.	.	6	2	3	6	17
1853	10	13	11	6	.	.	.	.	.	.	.	.	40
Fort Albany.													
1851	.	.	.	.	.	.	.	.	8	9	4	12	33
1852	16	6	9	.	.	.	.	.	.	.	.	.	31
Martin Falls.													
1850	.	.	.	.	.	.	.	2	10	8	8	5	33
1851	10	12	14	.	.	.	.	.	.	.	.	.	36
Lewis and Pelly.													
1851	7	9	7	2	.	.	.	1	5	4	4	9	48
1852	4	15	15	9	.	.	.	4	.	.	.	.	47
Matawagomingen.													
1850	.	.	.	.	.	.	3	6	5	4	.	.	18
1851	.	1	2	.	.	.	.	3	3	.	.	.	9
1852	.	2	.	4	3	.	.	.	.	.	.	.	9
Penetanguishene.[1]													
1852	.	.	.	.	.	.	10	4	6	3	.	.	23
1853	.	.	3	8	.	.	.	.	.	.	.	.	11
Lake Nipigon.													
1849	.	.	.	.	.	2	.	.	.	1	.	1	4
1850	.	4	7	7	.	.	.	.	.	.	.	.	18
Athabasca.													
1850	.	.	.	.	.	.	.	.	.	.	9	16	25
1851	20	19	18	.	.	.	.	.	.	.	.	.	57
Fort Confidence.													
1848	.	.	.	.	.	.	.	.	.	14	22	27	63
1849	15	16	18	7	.	.	.	.	.	.	.	.	56
1850	.	.	.	.	.	.	.	.	.	12	10	15	37
1851	8	15	11	4	.	.	.	.	.	.	.	.	38
Fort Enterprise.													
1820	.	.	.	.	.	.	.	10	6	7	8	20	51
1821	17	22	25	18	9	.	.	.	.	.	.	.	91
Cumberland House.													
1819	.	.	.	.	.	.	.	.	2	3	3	5	13
1820	5	7	16	15	11	.	.	.	.	.	.	.	54

[1] A few auroras were observed in 1848 and 1849.

LXXIII. AURORAS OBSERVED AT AALESUND, NORWAY, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1861	1	3	6	.	.	.	.	.	.	.	2	4	16
1862	3	4	.	.	.	.	.	.	1	4	2	2	16
1863	.	2	.	.	.	.	.	.	.	4	1	2	9
1864	2	2	6	1	.	.	.	.	.	3	1	.	15
1865	1	3	.	.	.	.	.	.	.	.	1	.	5
1866	1	2	.	.	.	.	.	.	.	3	4	.	10
Total	8	16	12	1	0	0	0	0	1	14	11	8	71

LXXIV. AURORAS OBSERVED AT STOCKHOLM, SWEDEN, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1859	.	.	.	.	.	.	.	.	2	.	.	.	2
1860	1	4	2	.	.	.	.	2	3	1	.	.	13
1861	.	.	5	.	.	.	.	.	.	1	.	3	9
1862	1	1	1	.	.	.	.	.	1	1	.	.	5
1863	1	2	1	2	.	.	.	.	1	.	.	2	9
1864	.	.	.	.	.	.	.	.	.	3	.	3	6
1865	4	.	4	1	.	.	.	3	1	1	1	1	16
1866	.	.	1	1	.	.	.	.	.	.	1	3	6
1867	1	.	1	1	.	.	.	.	1	.	1	.	5
Total	8	7	15	5	0	0	0	5	9	7	3	12	71
1783-92	27	34	50	56	13	0	0	19	44	39	34	25	341
Total	35	41	65	61	13	0	0	24	53	46	37	37	412

LXXV. SECOND GENERAL CATALOGUE OF AURORAS, ARRANGED BY YEARS AND MONTHS.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Before 1816.	22	34	52	18	46	35	22	23	23	36	24	27	362
1816	.	.	.	.	1	.	.	.	.	.	.	.	1
1817	.	2	.	.	.	1	.	1	.	1	.	.	5
1818	1	.	.	1	.	.	.	1	1	3	.	.	7
1819	.	.	1	1	.	.	.	.	1	1	.	.	4
1820	.	.	.	.	.	.	.	.	.	.	.	.	0
1821	6	1	.	.	.	.	.	.	7	6	3	2	25
1822	4	1	2	.	.	.	.	.	1	1	.	9	18
1823	.	4	.	.	.	.	.	.	1	.	.	.	5
1824	.	.	2	.	.	.	.	.	.	.	.	1	3
1825	.	.	.	.	.	.	.	1	2	1	.	1	5
1826	2	1	.	.	.	.	.	.	.	.	1	.	4
1827	.	3	1	1	.	.	.	.	4	7	2	.	18
1828	1	2	1	.	.	.	.	3	4	2	4	4	21
1829	.	4	5	4	.	.	.	.	3	2	2	1	21
1830	3	1	5	1	.	.	.	1	2	4	2	2	21
1831	6	2	2	5	.	.	.	1	.	.	.	.	16
1832	.	2	1	.	.	.	.	.	.	2	2	.	7
1833	3	2	.	1	.	.	1	.	1	3	.	.	11
1834	.	.	.	.	.	.	.	.	.	.	.	.	0
1835	.	.	1	.	.	.	.	2	1	.	2	3	9

SECOND GENERAL CATALOGUE OF AURORAS. *Continued.*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1836	.	1	1	.	.	.	2	.	3	3	1	.	11
1837	.	2	.	.	1	.	1	.	.	.	1	.	5
1838	.	1	.	.	.	.	.	.	.	1	.	.	2
1839	.	.	.	.	.	.	.	1	2	.	2	.	5
1840	1	.	1	1	.	1	.	1	1	.	.	2	8
1841	1	.	.	1	.	.	.	.	.	.	.	.	2
1842	.	.	.	.	.	.	.	.	1	.	.	.	1
1843	.	.	.	.	.	.	.	.	1	.	.	1	2
1844	.	.	1	1	.	1	.	.	.	.	.	.	3
1845	.	.	.	.	3	.	.	1	.	.	.	.	4
1846	.	.	.	.	.	1	2	.	.	.	.	1	4
1847	.	1	3	.	.	.	.	.	.	1	.	.	5
1848	.	1	2	.	.	.	1	.	2	1	1	.	8
1849	.	.	1	.	7	4	3	5	4	1	4	1	30
1850	4	6	6	9	7	16	15	10	4	7	21	9	114
1851	14	10	21	21	15	16	16	15	12	13	21	19	193
1852	17	17	12	11	10	10	14	16	6	16	17	12	158
1853	15	20	12	17	5	5	3	3	3	9	4	5	101
1854	.	6	6	6	3	1	2	.	1	4	1	.	30
1855	3	5	2	4	1	4	2	4	2	3	3	1	34
1856	.	6	7	3	.	1	4	3	6	3	4	6	43
1857	.	1	3	1	3	1	5	1	6	2	1	2	26
1858	5	1	.	4	6	5	4	4	6	6	4	2	47
1859	3	4	11	8	8	3	5	3	7	5	5	3	65
1860	6	3	5	7	7	2	12	7	2	7	2	4	64
1861	5	5	2	13	5	2	4	5	9	7	6	12	75
1862	6	5	7	7	8	3	7	8	6	8	6	9	80
1863	7	5	9	7	2	5	6	5	7	5	8	7	73
1864	9	8	10	10	3	5	3	9	7	13	4	11	92
1865	15	14	15	7	5	7	8	14	12	16	7	4	124
1866	7	7	10	5	7	2	3	5	4	12	12	3	77
1867	.	.	1	2	5	.	1	4	5	.	.	.	18
1868	.	.	2	3	.	.	1	.	.	.	.	.	6
2d Cat.	144	167	195	163	141	122	134	134	149	184	158	157	1848
Suppl.[1]	58	52	73	92	75	18	47	74	55	47	32	26	649
Total	202	219	268	255	216	140	181	208	204	231	190	183	2497
1st Cat.	932	950	1168	915	497	315	363	630	1015	1110	964	907[2]	9885[2]
Total	1134	1169	1436	1170	713	455	544	838	1219	1341	1154	1090	12382

[1] These supplementary numbers are obtained from the auroras printed on pages 306 – 310.

[2] Erroneously printed on page 200.

By the help of my second catalogue, and the supplement, the yearly march in the number of auroras observed, from month to month, can be accurately determined for Sitka, Toronto, Quebec, Newfoundland, etc., for which the materials in the first catalogue were insufficient. But the large addition of more than two thousand to the aggregate number of auroras will throw little light on our inquiry into the secular periodicity of the aurora, inasmuch as they belong, for the most part, to a short period of years, and furnish no long series of observations at any single place. And even those subordinate fluctuations, which some suppose to move synchronously with the disturbances on the sun's surface, require for their elucidation continuous observations, at the same place, for many decades.

If sufficient evidence exists for believing that the disturbances in the sun's atmosphere, which reveal the solar spots, are associated in time with those other disturbances, whatever they may be, which result in displays of the aurora, this coincidence between the two classes of phenomena, pointing to a mutual dependence or to a common origin, will guide speculation, if it do not even furnish the key for the unlocking of some of the great mysteries of the physical world. The testimony in favor of such a coincidence must, therefore, be subjected to a rigid examination. A glance at the curves which represent the periodicity of these phenomena will satisfy any one that the march of the changes in spot-frequency is far more regular, both in degree and in time, than that which is furnished by the aurora.

I shall now examine separately each of the twenty-eight maxima and minima of the solar spot curve between 1700 and 1860. 1. First comes a maximum in 1705. A decided maximum of the aurora is found in 1707. If the secular period of the aurora is taken at fifty-seven years, a secular minimum would have occurred about the year 1701. This may account for the postponement of the subordinate maximum by two years. Six auroras were observed in Great Britain in 1709, a few before, but none afterwards for six years. 2. The spot-minimum of 1712 is accompanied by an aurora-minimum. I attach less weight, in general, to the agreement of minima, because the evidence is negative. The number of observed auroras is subject to violent transitions, from year to year, not witnessed in the number of solar spots. As few auroras were observed in 1714 and 1715 as in 1712. Nevertheless the year 1712 is the central period of half a dozen years during which auroras were infrequent. No auroras were recorded in Germany in 1712, 1713, 1714, and 1715, although four or five in all were seen during the four preceding years, and more afterwards. 3. Next comes the spot-maximum of 1717. There seems to have been an aurora-maximum in Paris. But an error exists undoubtedly in the record, which has doubled the number

of observations. Either the year 1716 or 1719 is the more probable time. No auroras were observed in Sweden in 1717 or 1719, and only one in 1716 and 1720; but nine were observed in 1718. Four auroras were observed in Berlin in 1717; but four were also observed in 1718, 1720, and 1722. In Great Britain, two auroras were seen in 1717, none in 1718, but nine in 1719. Two auroras were seen at Salem in 1719, the first recorded appearances in New England. 4. In 1723 comes another spot-minimum. In Sweden there is a plausible conformity on the part of the aurora, though the minimum comes one or two years earlier. In Great Britain no auroras were observed in 1724; but more were seen in 1723 than in any previous year since 1719. In Berlin, also, none were seen in 1724, but more were seen in 1725 than at the spot-maximum of 1717. In Germany an aurora minimum may be conceded to the year 1723, although three more were seen than in 1720, and four more than in the year of spot-minimum, 1717. The twenty-eight auroras observed in that country in 1722 militates strangely against the supposition of an auroral minimum the very next year. The absence of all auroras in America in 1723 proves nothing, as they were equally wanting in 1717 and 1727, both years of spot-maxima. 5. I pass on to the spot-maximum of 1727. A large number of auroras is recorded against this year in Italy. But the force of this agreement is weakened by the fact that almost as many were seen in 1730 and possibly more in 1724. In France none are found for 1727, and fifteen for 1724. In Germany only thirteen auroras were seen in 1727, and forty-two in 1730. In Berlin the number of auroras was larger than in 1723, but not so large as in 1730 and 1732. In Great Britain the number of auroras was greater than in the years immediately preceding and following, but exactly the same as in 1723. In Sweden eight auroras were observed, or more than in any other year since 1718, but the number continually increased until it reached fifty-two in 1730. In St. Petersburg eleven auroras were seen in 1727, and thirty-six in 1730, with six and twenty-five for the two intermediate years. The observations at Abo and Cola may be left out of the account, as the series are evidently defective. 6. In 1733 occurs the next spot-minimum. In Italy only one aurora was seen this year and the next, but none in 1729. An extraordinary number of auroras are recorded against the years 1732, 1733, and 1734, although 1733 is the minimum year of the three, in France, which, if not otherwise explained, flatly contradict the Wolf theory. The Wittemberg observations exhibit an unqualified minimum for 1733. The German observations, in general, point to an equally decisive minimum, although it comes a year later. Three times as many auroras were seen in Holland in 1733 as in 1729, but a great increase appears in the following years. In Berlin there is a good maximum in 1732, and nearly one in 1733. In the two

following years there are only half as many, and the series itself terminates soon afterwards. The record at Plymouth is more consistent with a maximum than a minimum. No auroras were observed at Upsal in 1733, 1734, and 1735, but none also were observed in 1738, the year of the next spot-maximum. In St. Petersburg the number of auroras had declined from thirty-six to six, but only six were seen also in 1729. If the influence of the secular change, which raised up a secular maximum in 1730, could be eliminated, the residual phenomena might be more consistent with the fluctuations in the solar spots. 7. A spot-maximum is assigned to the year 1738. In Italy an aurora-maximum comes one year earlier. In France no auroras are recorded between 1737 and 1750. In Holland forty-two auroras were observed in 1738, but more in 1736, 1739, and 1741. In Germany no auroras were observed in 1738, but thirteen in 1736, and eleven in 1739. In Wittemberg one aurora was observed in 1738, eight in 1737 and 1743, and eleven in 1742. In Plymouth as many auroras were seen in 1738 as in 1742, but not so many as in 1736, 1737, 1739, and 1741. In Lincoping the maximum number of fourteen falls upon the year 1738, but the number sinks to two the following year, the series coming to an end. Twelve were seen at that place in 1734. In Upsal auroras appeared in large numbers in 1739, 1740, 1742, 1743, and particularly in 1741, but none in 1738. In St. Petersburg the number of auroras increased from seven in 1738 to twenty-nine in 1742. In America no auroras were seen in 1738, but five in 1741. 8. The spot-minimum of 1745 comes next under examination. In Italy only two auroras were seen in that year, still fewer in the preceding and following years, but six in 1750. The minimum in France conveys no meaning as it existed for twelve years. In Wittemberg only one aurora was seen in 1744, 1745, and 1746, and none in 1749, though the latter year is so near the spot-maximum of 1750. In Germany the auroras decreased after 1739, but there were fewer in 1742, 1743, and 1744 than in 1745, and thirteen in 1746. In Holland there is a very decided minimum in 1744 and 1745. The small number of auroras registered by Musschenbroek in the year 1740 is probably to be explained by his change of residence from Utrecht to Leyden. In Zwanenburg the minimum of 1745 is unchallenged. In Plymouth, also, a satisfactory minimum falls upon the same year. In Upsal there is a minimum in 1744, though fifty auroras were seen in 1746. In St. Petersburg only one aurora was seen in 1744 and 1745, but only one was seen in 1749, and ten in 1746. There were six observed at that place in 1747. The minimum at Cambridge in 1745 and 1744 is unqualified. 9. The next spot-maximum is in the year 1750. In Italy there seems to be also a maximum of auroral display. The same is true of Wittemberg. In

Germany seventeen auroras were seen in 1750, but not so many as in 1748, 1749, and 1752. In Holland there is a maximum in 1750, although two more auroras were seen in 1747 than in 1750. In Zwanenburg there is a strong maximum in 1750. At Upsal twenty-seven auroras were seen in 1750, twenty-two in 1751, but fifty in 1746, only one year after the last spot-minimum. At St. Petersburg, the five years which include the maximum do not supply as many auroras as the five years which include the preceding minimum. At Abo there is a maximum, but larger in 1752. At Cambridge there is a conspicuous maximum. 10. Next comes the spot-minimum of 1755. In Holland twenty-two auroras were seen in 1755, 1756, and 1758, forty-two in 1754, and only sixteen in 1753. In Germany none were seen either in 1755 or at the next spot-maximum in 1761, and indeed only two between 1753 and 1768. At Zwanenburg there is a satisfactory minimum. At Upsal a small number were seen in 1755, but none in 1757 and 1758, probably on account of a break in the continuity of the series. At St. Petersburg only four auroras were seen in the six years from 1753 to 1758 inclusive. But this may have been the effect of the secular minimum which came about this time. At Abo there is a satisfactory minimum in 1756. The Cambridge observations accord well with Wolf's theory, no auroras being seen in 1754, 1755, and 1756. 11. In the year 1761 is another spot-maximum. Few auroras were observed about this time, except in high latitudes. In Zwanenburg eight auroras were seen in 1759, and there the series ends. In Upsal forty-eight auroras were seen in 1761, but rather more in 1760 and 1759. In 1762 a clear maximum is made out for St. Petersburg. At Abo it comes exactly upon 1761. At Cambridge the year 1761 is midway between two years when no auroras were seen, but itself is distinguished by fewer auroras than the eight years which precede and follow it. 12. In the year 1766 is a spot-minimum. In the same year was a decided aurora-minimum at St. Petersburg. It came a year later at Abo. In other parts of Europe auroras were very scarce, not only this year, but for the ten preceding years. 13. The next spot-maximum is in the year 1769. In Germany the aurora rose suddenly to a maximum in 1770. In Berlin and St. Petersburg it was later by one year. At Abo it came in 1769. At Cambridge and New Haven it coincided with the spot-maximum. 14. In the year 1775 is another spot-minimum. There was an apparent minimum of the aurora in France, although as many auroras were seen that year as in 1769 and 1771, and twice as many as in 1770. In Böningen, Jena, Berlin, and Germany in general, there is a satisfactory minimum. In St. Petersburg there is a minimum in 1776, but a strong maximum in 1774. At Abo the number of auroras in 1775 and 1776 was less than in the four preceding years, but in 1774 more auroras were observed than in any pre-

vious year of the series, or during the twelve following years. In Franeker more auroras were seen in 1775 than at the following spot-maximum of 1779. In 1776 there was a minimum at New Haven and Cambridge, but an equal minimum at New Haven in 1771. 15. Now arrives the spot-maximum of 1779. In the same year are indications of an aurora-maximum in Spain, Switzerland, France, Austria; also in St. Petersburg, Copenhagen, Berlin, Jena, Carlsruhe, Böningen, and Montmorenci. In Brussels a large number of auroras were seen in 1778 and 1779, but none in 1780 and 1781. A large number were also seen at Franeker in 1779 and the two preceding years, but few in the three following years. While twenty-four were seen at Berlin in 1779, only two were seen in 1780. In Jena, Böningen, Montmorenci, and St. Petersburg, the number was small for 1780. At Abo not so many were seen in 1779 as at the spot-minimum of 1775, and none whatever in 1780 and 1781. In New Haven and Cambridge there is as good evidence of a minimum in 1779 as in 1775. A comparison of the series observed at Cambridge with that observed at New Haven will, however, justify the opinion that the Cambridge series is defective about this period. 16. The spot-minimum of 1784 comes next under consideration. In Brussels, Mannheim, St. Petersburg, and Abo, an aurora-minimum falls upon the same year. In Italy, France, and Germany, in Montmorenci, Ratisbon, Carlsruhe, Prague, Sagan, Berlin, Copenhagen, and Spydberg, it comes in 1785. Only one aurora was seen at Jena in 1785, but none were seen in 1782. None were seen in Great Britain in 1784 or 1779. In Cambridge and New Haven the minimum belongs to 1784. 17. Another spot-maximum appears in 1787. In Switzerland, France, Germany, in Montmorenci, Paris, Ratisbon, Prague, Mannheim, Copenhagen, Spydberg, and Abo, an aurora-maximum is in the same year. In Berlin, St. Petersburg, and perhaps Brussels, it comes one year earlier; and in Sagan, Jena, and Great Britain, one year later. There were none at Prague in 1788 and 1789, and thirteen in 1787. No auroras were recorded at Carlsruhe in 1785, 1787, and 1788. In New Haven, Cambridge, and perhaps Salem, the year 1786 claims the aurora-maximum. How far the great number of auroras, generally observed at this epoch, was caused by the secular maximum, and how far by a subordinate maximum, it may not be easy to decide. 18. After a long interval comes the spot-minimum of 1798. This year contains, decidedly, an aurora-minimum, only two having been observed the whole earth over. 19. The year 1804 brings with it another spot-maximum. A feeble aurora-maximum can be traced in the observations made in Great Britain, France, Germany, St. Petersburg, and Abo, for the year 1804. The same remark will apply to Salem, and perhaps to New Haven. 20. The year 1810 is another in which the solar spots reach a minimum. Only two

auroras were observed anywhere, in 1810 and 1813, and none in 1812. It must be remembered that a secular minimum of the aurora approximates to the year 1812. 21. Another spot-maximum in 1816. As this year comes so close to the secular minimum, we have to deal with a very small number of auroras, in comparing one year with another. There are indications of a slight aurora-maximum in 1817, at Ratisbon, Carlsruhe, Germany, Great Britain, Sweden, and Abo. At Arkhangel three auroras were observed in 1816, seven in 1817, and sixteen in 1819. In Maine there are none from 1809 to 1813 inclusive, but many in the years which cluster around 1816, though the largest number was seen as late as 1818. At Salem, also, the average near 1816 much exceeds the average near 1810, the greatest number, however, being as late as in 1819, and none in 1816 and 1817. The observations at Boston and New Haven, so far as they prove anything, would postpone the aurora-maximum to 1818 or 1819. 22. Another spot-minimum follows in 1823. No aurora was seen in Europe that year, except in high latitudes. One aurora was seen in Abo, and two in Arkhangel. In Boston not so many auroras were seen in 1822, 1823, and 1824, as in the three years preceding or following. In Maine none were seen in 1822, 1824, 1825, and 1826, though two were seen in 1823. In the five years of which 1823 is the central epoch, far fewer auroras were seen in Maine than in the five years which preceded or followed. Parry and Von Wrangel have commented on the rarity and poverty of the aurora, even in arctic latitudes, during the winter of 1822–23.[1] 23. Seven years bring about the next spot-maximum in 1830. In Great Britain there was a regular increase in the number of auroras from 1824 to 1830, the minimum being zero, and the maximum being thirty-two. The decrease afterwards was far less regular. A similar remark will apply to Abo, the minimum being one, and the maximum being thirty-four. At Arkhangel the number of auroras increases, but not with perfect regularity, from zero in 1824 to thirteen in 1831, and then the series of observations terminates. In Germany there were many more auroras at the maximum of 1830 than at the minimum of 1823, if the maximum and minimum are understood as covering each five years; but the largest number in a single year belongs to 1831. At Leith there is no indication of a maximum, unless it be placed as early as 1827. In St. Petersburg a maximum of twelve auroras was seen in 1830, although in 1829 there were none. In the low latitudes of Europe more auroras were registered in 1831 than are recorded for any other year since 1789; but the number was only five. In America the observations made in the States of New York and Maine, also in New Haven and Wilmington, favor the theory of an aurora-maximum in 1830, and

[1] See page 103 of this volume of the Memoirs of the American Academy.

an aurora-minimum in 1823. The Boston series of observations notices only the more brilliant auroras. More are recorded for 1830 than for any other year since 1819. But for two years before 1830, and for four years afterwards, there were none. 24. After a very brief interval, the spot-minimum of 1833 approaches. The European observations are consistent with the supposition of an aurora-minimum in 1833, as compared with 1830. However, thirteen auroras were observed at Wasa in 1833. The American observations, with the exception of those made at New Haven, agree with the European observations in the conclusion to which they point. 25. A spot-maximum comes again in 1837. In the low latitudes of Europe, in France, and in Germany, at St. Petersburg and at Abo, there is a slight aurora-maximum in 1837, as contrasted with 1833. In Great Britain there is no indication of such a maximum. In Maine and New York, in Boston, Providence, and New Haven, the number of auroras has increased since 1833, although the increase has not always reached its limit in the year 1837. 26. A spot-minimum arrives in 1843. In France and Russia an aurora-minimum is possible in the same year. In Dunse and Christiania an aurora-minimum in 1844 or 1845 is more probable. In Germany and Great Britain there is nothing to justify the suspicion of an aurora-minimum in 1843. The observations made in New Haven, Providence, Cambridge, Boston, Newberry, New York State, Toronto, and possibly Worcester, permit the assumption of an aurora-minimum in 1843 as compared with 1837. 27. In 1848 is another spot-maximum. More than the usual number of auroras were counted this year in the low latitudes of Europe. In 1847, 1848, and 1849, more auroras were seen in France than in 1842, 1843, and 1844. In Germany, Great Britain, Russia, and perhaps Christiania, there is an apparent maximum about 1848. In America, at most of the places where regular observations were made, the year 1848 represents a period of greater activity in the aurora than the year 1843. The observations at Worcester and Jakobshavn are not clear in their utterance on this point; and in New York State the number of auroras observed in 1847, 1848, and 1849 was not so large as the number observed in 1839, 1840, and 1841. The secular maximum, which occurred some time between 1840 and 1850, would have some influence upon the subordinate maxima and minima of this period. 28. A spot-minimum is found in the year 1856. In the low latitudes of Europe, in France, Germany, Great Britain, Russia, Christiania, the observations accord well with the supposition of an aurora-minimum in 1856. The observations at Providence, Cambridge, Worcester, Newberry, and Toronto agree with the European observations in their silent testimony. In New York State the great reduction in the number of observed auroras is partly due to other causes than the infrequency of the phenomenon.

In Tables LXXVI. and LXXVII. the number placed against each year of spot-maximum or minimum represents the number of auroras observed in that year, added to the numbers observed in the preceding and following years. In this more general mode of comparison the coincidences are more numerous, and the discrepancies are not so glaring, between the fluctuations of the solar spots and of the aurora, as when single years are used instead of small groups. But it seems to me doubtful whether, in any case, the agreement is sufficiently exact and frequent to justify the conclusion that the two classes of phenomena are associated, either as cause and effect, or as common effects of some remote and unknown cause. On the supposition of such an affiliation as Wolf advocates, it is wonderful that the long secular period in which the number of auroras slowly oscillates between such wide extremes of maxima and minima should be inconspicuous in the increments and decrements of the solar spots. In 1787, and again about 1849, when the aurora-curve towers to unprecedented heights, the solar spots scarcely respond to the summons which theory serves upon them to do likewise. During the aurora-minimum of 1758, and throughout the dismal blank which precedes and follows the aurora-minimum of 1812, the number of solar spots, though somewhat diminished, indicates nearly the usual amount of activity on the sun's surface.

LXXVI. NUMBER OF AURORAS FOR EACH THREE YEARS WHICH CENTRE ABOUT A MAXIMUM OR MINIMUM OF SPOT-FREQUENCY.

		Lat. 0°–46°.	Lat. 46°–55°.	Lat. 55°–P. C.	Europe.	Lat. 0°–46°.	Lat. 46°–55°.	Lat. 55°–P. C.	America.	Total.
Max.	1705	.	2	.	2	.	.	.	.	2
Min.	1712	.	1	.	1	.	.	.	.	1
Max.	1717	1	47	14	61	.	.	.	.	61
Min.	1723	2	93	21	118	.	.	.	.	120?
Max.	1727	23	101	111	250?	2	.	.	2	250?
Min.	1733	7	200	132	299	.	.	.	.	299
Max.	1738	18	148	129	282	5	.	.	5	283
Min.	1745	3	64	85	148	8	2	.	8	155
Max.	1750	10	105	81	183	33	1	.	34	197
Min.	1755	2	81	43	126	.	.	.	.	126
Max.	1761	.	5	144	150	18	.	2	20	159
Min.	1766	1	1	12	15	11	.	.	11	27
Max.	1769	1	45	52	89	40	.	2	42	120
Min.	1775	13	124	85	188	28	.	.	28	203
Max.	1779	19	197	97	259	48	.	.	48	282
Min.	1784	16	133	87	207	50	.	.	50	233
Max.	1787	45	331	218	453	150	.	.	196?	522?
Min.	1798	.	19	4	23	.	.	.	.	23

NUMBER OF AURORAS FOR EACH THREE YEARS WHICH CENTRE ABOUT A MAXIMUM OR MINIMUM OF SPOT-FREQUENCY. *Continued.*

		Lat. 0°–46°.	Lat. 46°–55°.	Lat. 55°–P.C.	Europe.	Lat. 0°–46°.	Lat. 46°–55°.	Lat. 55°–P.C.	America.	Total.
Max.	1804	.	22	4	37	13	.	.	13	44
Min.	1810	.	1	1	7?	2	.	.	2	9?
Max.	1816	.	13	15	31?	6	.	.	6	36?
Min.	1823	.	2	11	?	3	.	13	?	?
Max.	1830	3	87	105	165	173	.	4	?	?
Min.	1833	.	26	24	?	112	.	159	?	?
Max.	1837	3	33	105	?	198	.	1	199	?
Min.	1843	4	25	161	182	184	.	324	?	?
Max.	1848	2	108	190	253	386	129	32	?	?
Min.	1856	.	10	69	?	144	.	.	?	?

LXXVII. NUMBER OF AURORAS FOR EACH THREE YEARS WHICH CENTRE ABOUT A MAXIMUM OR MINIMUM OF SPOT-FREQUENCY.

		Italy.	France.	Wittemberg.	Holland.	Germany.	Berlin.	Great Britain.	Upsal.	St. Petersburg.	Abo.	Cambridge.	New Haven.	Salem.	Worcester.	Newberry.	Toronto.
M.	1705	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
m.	1712	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
M.	1717	.	16	.	.	20	11	3	10	.	.	.	.	.	.	.	.
m.	1723	16?	16?	.	.	52	6	7	5	.	.	.	.	.	.	.	.
M.	1727	23	2	.	.	40	15	26	42	38	.	.	.	.	.	.	.
m.	1733	7	106	11	69	20	27	14	42	31	.	.	.	.	.	.	.
M.	1738	17	1	13	131	18	.	1	50	36	.	.	.	.	.	.	.
m.	1745	3	.	3	40	16	.	1	85	12	.	7	.	.	.	.	.
M.	1750	10	1	7	73	49	.	3	81	10	24	32	.	.	.	.	.
m.	1755	.	.	.	86	.	.	.	41	2	12	.	.	.	.	.	.
M.	1761	.	2	.	.	.	.	.	110	46	40	18	.	.	.	.	.
m.	1766	.	1	.	.	.	.	1	.	12	16	10	1	.	.	.	.
M.	1769	.	12	.	.	32	22	2	Sweden.	26	26	36	17	.	.	.	.
m.	1775	.	29	.	.	27	21	1		81	34	24	7	.	.	.	.
M.	1779	2	73	.	.	56?	41	.		87	12	30	20	.	.	.	.
m.	1784	6	34	.	.	87	21	.	32	38	1	24	21	.	.	.	.
M.	1787	17	73	.	.	187	37	96	155	60	63	58	81	97	.	.	.
m.	1798	.	3	.	.	1	.	15	.	2	1	.	.	.	.	.	.
M.	1804	.	4	.	.	2	.	16	3	4	11	.	7	11	.	.	.
m.	1810	.	.	.	.	1	.	.	1	.	.	.	.	2	.	.	.
M.	1816	.	1	.	.	10	.	7	2	.	2	.	.	1	.	.	.
m.	1823	.	1?	.	.	1	.	1	Christiania.	2	5	.	.	Provi-dence.	.	.	.
M.	1830	3	1	.	.	7	.	73		17	88	.	8		.	.	.
m.	1833	.	.	.	.	2	.	21		7	17	.	14		.	.	.
M.	1837	2	12	.	.	6	.	22		5	24	.	84	22	.	.	.
m.	1843	4	5	.	.	11	.	56	109	?	.	20	31	6	20	8	56
M.	1848	4	14	.	.	40	.	126	119	7	.	33	103	31	23	32	178
m.	1856	.	.	.	.	4	.	.	61	1	.	25	.	2	1	15	106

There is reason for thinking that the abnormal disturbances in the sun's crust are coincident with unusual magnetic perturbations. On September 1, 1859, Carrington and Hodgson were watching the sun at different observatories, and noticed a spot crossing the surface, between $11^h\ 18^m$ and $11^h\ 23^m$ A. M. Almost at the same moment, viz. at $11^h\ 20^m$, the self-registering magnetic instruments at Kew recorded the violent jerks to which they were subjected, and a magnetic storm extended widely through the earth. Great stress is laid upon the fact that there was on the same day a signal display of aurora, which was extensively seen, and so potent as to interfere with telegraphing, and set on fire the telegraphic offices. Upon this coincidence Mr. Carrington makes the following judicious comment: "While the cotemporary disturbance deserves noting, he would not have it supposed that he even leans towards hastily connecting them. One swallow does not make a summer."[1] It is not a serious objection to the supposed connection between the solar spots and the aurora, that, in this particular case, the passage of the spot was confined to a few minutes, while the aurora lingered for many days; for a cause may be sudden and short-lived, while its effect is more lasting. But the fact that the effect anticipated the cause, that the aurora was brilliantly displayed as early as the 28th of August, and more or less conspicuously on the three following nights, does not admit of as easy explanation. If the outbreak of special spots upon the sun can be associated, in time, with extraordinary motions in the instruments which register the earth's magnetic condition, the foundation is laid for the hypothesis that sun-storms and aurora-storms are remotely, if not intimately, linked to one another. For one of the first fruits of the magnetic crusade originated by Humboldt was the verification, by abundant examples, of what had been distinctly pronounced before, viz., the synchronism of auroral storms and magnetic storms. In the last century the Abbé Mann wrote:[2] "I have frequently observed the irregular magnetic variations during great auroras, as in 1767." Arago, watching his needles in Paris, saw by his intellectual vision what Parry beheld with the natural eye. And Kupffer was so confident that auroras, which might even be shrouded from the upper world by clouds, were faithfully announced to underground observers throughout the whole line of Russian Magnetic Observatories, as to think that the direct observation of the aurora might be neglected even when the weather was propitious.

The two following Tables have been prepared to facilitate the comparison between the *Maxima* and *Minima* of solar spots and auroras.

[1] Month. Notices of the Roy. Astron. Soc., XX. 13–15.

[2] Mém. de l'Acad. Brux., I. 265.

LXXVIII. AURORAS OBSERVED IN DIFFERENT YEARS, ARRANGED ACCORDING TO LOCALITY.

Years.	Corsica.	Italy.	Spain.	Switzerland.	Paris.	France.	Vienna.	Wittemberg.	Germany.	Holland.	Berlin.	G. Britain.
1700	.	.	.	.	.	.	.	.	.	.	.	.
1701	.	.	1	.	.	.	.	.	.	.	.	.
1702	.	.	.	.	.	.	.	.	.	.	.	.
1703	.	.	.	.	.	.	.	.	.	.	.	.
1704	.	.	.	.	.	.	.	.	.	.	.	.
1705	.	.	.	.	.	.	.	.	.	.	.	.
1706	.	.	.	.	.	.	.	.	.	.	.	1?
1707	.	.	.	.	.	.	.	.	.	.	4	2
1708	.	.	.	.	.	.	.	.	1	.	.	2
1709	.	.	.	.	.	.	.	.	1	.	.	6
1710	.	.	.	.	1	1	1	.	2?	.	.	.
1711	.	.	.	.	.	.	.	.	1	.	.	.
1712	.	.	.	.	.	.	.	.	.	.	.	.
1713	.	.	.	.	.	.	.	.	.	.	.	.
1714	.	.	.	1	.	.	.	.	.	.	.	.
1715	.	.	.	.	.	.	.	.	.	.	.	.
1716	.	.	.	.	5	6	.	.	9	6	3	1
1717	.	.	.	.	8?	8?	.	.	5	.	4	2
1718	.	.	.	2	.	2	.	.	6	.	4	.
1719	.	1	.	1	2	7	.	.	10	2	3	9
1720	1	.	.	.	6	6	.	.	6	.	4	3
1721	.	.	.	.	.	4	.	.	11	.	3	4
1722	.	1	.	.	.	.	.	.	28	.	4	2
1723	.	.	.	.	.	1	.	.	9	.	2	5
1724	.	15?	.	.	.	15?	.	.	15?	.	.	.
1725	.	.	.	.	.	.	.	.	15	.	5	3
1726	.	1?	.	2	.	2	.	.	10	.	1	4
1727	.	12	.	.	.	.	.	.	13	.	4	5
1728	.	10	.	1	.	.	.	.	17	18	10	14
1729	.	.	.	.	8	8	.	.	18	4	6	8
1730	.	11	.	1	9	9	.	4	42	6	11	7
1731	.	2	.	.	5?	5	.	9	7	11	7	6
1732	.	5	.	.	41	46	.	5	17	15	12	2
1733	.	1	.	.	19	27	.	3	2	12	10	9
1734	.	1	.	.	28	33	.	3	1	42	5	3
1735	.	3	.	.	.	.	.	9	10	43	5	7
1736	.	6	.	.	1	2	.	6	13	64	1	11
1737	.	10	1	.	.	1	.	8	7	38	.	9
1738	.	3	.	.	.	.	.	1	.	42	.	6
1739	.	4	.	.	.	.	.	4	11	51	.	8
1740	.	1	.	.	.	.	.	.	2	2	.	4
1741	.	3	.	.	.	.	.	5	4	44	.	7
1742	.	.	.	.	.	.	.	11	1?	17	.	6

AURORAS OBSERVED IN DIFFERENT YEARS, ARRANGED ACCORDING TO LOCALITY. *Continued.*

Plymouth.	Copenhagen.	Sweden.	Lincoping.	St. Petersburg.	Abo.	Siberia.	Lapland.	Philadelphia.	Cambridge.	Salem.	Years.	Solar Spots.
.	.	.	.	.	.	.	.	.	.	.	1700	
.	.	.	.	.	.	.	.	.	.	.	1701	
.	.	.	.	.	1	.	.	.	.	.	1702	
.	.	.	.	.	.	.	.	.	.	.	1703	
.	1	.	.	.	.	.	.	.	.	.	1704	
.	.	.	.	.	.	.	.	.	.	.	1705	Max.
.	.	.	.	.	.	.	.	.	.	.	1706	
.	4	.	.	.	.	.	3	.	.	.	1707	
.	.	.	.	.	.	.	.	.	.	.	1708	
.	.	.	.	.	.	.	.	.	.	.	1709	
.	.	.	.	.	.	.	.	.	.	.	1710	
.	.	.	.	.	.	.	.	.	.	.	1711	
.	.	.	.	.	.	.	.	.	.	.	1712	Min.
.	.	.	.	.	.	.	.	.	.	.	1713	
.	.	.	.	.	.	.	.	.	.	.	1714	
.	.	.	.	.	.	.	.	.	.	.	1715	
.	.	1	.	.	.	.	.	.	.	.	1716	
.	.	.	.	.	.	.	.	.	.	.	1717	Max.
.	1	9	.	.	.	.	.	.	.	.	1718	
.	.	.	.	.	.	.	.	.	.	2	1719	
.	.	1	.	.	.	.	.	.	.	1	1720	
.	.	.	.	.	.	.	.	.	.	.	1721	
.	.	.	.	.	.	.	.	.	.	.	1722	
.	.	1	.	.	.	.	.	.	.	.	1723	Min.
.	.	4	.	.	.	.	.	.	.	.	1724	
.	.	5	.	.	.	.	.	.	.	.	1725	
.	.	7	.	2	.	.	.	.	.	.	1726	
.	.	8	.	11	.	.	29	.	.	.	1727	Max.
13	.	27	.	25	.	.	19	.	.	2	1728	
8	.	31	.	6	.	.	8	.	.	.	1729	
7	.	52	.	36	22	.	1	.	1	.	1730	
6	.	36	.	18	.	.	.	1	.	.	1731	
2	.	42	.	12	.	.	.	.	.	.	1732	
9	1	.	.	6	.	.	.	.	.	.	1733	Min.
3	.	.	12	13	.	.	.	.	.	.	1734	
2	.	.	6	7	.	.	.	.	.	.	1735	
11	.	14	11	9	.	.	12	.	.	.	1736	
9	.	5	11	10	.	1	29	2	.	.	1737	
6	.	.	14	7	.	.	.	.	.	.	1738	Max.
7	.	45	2	19	.	4	.	3	1	.	1739	
4	.	37	.	13	.	.	.	.	.	.	1740	
7	.	83	.	26	.	.	.	1	5	.	1741	
6	.	47	.	29	.	2	.	.	4	.	1742	

AURORAS OBSERVED IN DIFFERENT YEARS, ARRANGED ACCORDING TO LOCALITY. *Continued.*

Years.	Italy.	Spain.	Switzerland.	Montmorenci.	Paris.	France.	Austria.	Wittemberg.	Böhmen.[1]	Jena.	Berlin.	Germany.	Brussels.	Holland.
1742	.	.	.	.	.	.	.	11	.	.	.	1?	.	17
1743	1	.	.	.	.	.	.	8	.	.	.	.	.	14
1744	1	.	.	.	.	.	.	1	.	.	.	1	.	9
1745	2	.	.	.	.	.	.	1	.	.	.	2	.	9
1746	.	.	.	.	.	.	.	1	.	.	.	13	.	22
1747	3	.	.	.	.	.	.	3	.	.	.	13	.	36
1748	1	.	.	.	.	.	.	2	.	.	.	23	.	24
1749	3	.	.	.	.	.	.	.	.	.	.	22	.	18
1750	6	.	.	.	1	1	.	6	.	.	.	17	.	31
1751	1	.	.	.	.	.	.	1	.	.	.	10	.	21
1752	.	.	.	.	.	.	.	.	.	.	.	22	.	33
1753	.	.	.	.	.	.	.	.	.	.	.	2	.	16
1754	.	.	.	.	.	.	.	.	.	.	.	.	.	42
1755	2	.	.	.	.	.	.	.	.	.	.	.	.	22
1756	.	.	.	.	.	.	.	.	.	.	.	.	.	22
1757	.	.	.	.	.	1	.	.	.	.	.	.	.	31
1758	.	.	.	.	.	.	.	.	.	.	.	.	.	22
1759	.	.	1	.	.	2	.	.	.	.	1	2	.	.
1760	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1761	.	.	1	.	.	.	2	.	.	.	.	.	.	.
1762	.	.	.	.	2	2	.	.	.	.	.	.	.	.
1763	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1764	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1765	1	.	.	.	1	1	.	.	.	.	.	.	.	.
1766	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1767	1	.	.	.	.	.	.	.	.	.	.	.	.	.
1768	1	.	2	.	3	3	1	.	2	.	1	1	.	.
1769	.	.	.	.	3	6	2	.	2	.	2	2	.	.
1770	.	1	3	.	1	3	1	.	3	7	19	29	.	.
1771	.	.	2	4	1	6	.	.	1	1	24	25	.	.
1772	.	.	.	4	.	8	1	.	2	1	15	16	.	.
1773	.	1	1	3	1	12	.	.	9	.	20	23	1	.
1774	.	.	.	6	.	16	.	.	5	.	13	19	4	.
1775	.	.	.	4	.	6	1	.	1	.	4	4	3	.
1776	.	.	.	7	.	7	.	.	1	.	4	4	10	.
1777	.	2	1	16	.	17	3	.	4	4	12	15	6	.
1778	.	2	1	12	.	20	3	.	5	5	11	16	22	.
1779	.	5	4	17	.	40	4	.	18	12	24	31	17	.
1780	2	2	4	8	.	13	2	.	7	5	2	9	.	.
1781	.	.	.	16	1	16	1	.	8	4	15	53	.	.
1782	3	.	.	7	.	7	.	.	.	.	12	32	4	.
1783	3	.	.	13	2	15	.	.	.	5	12	47	6	.
1784	2	.	1	5	5	13	1	.	.	3	6	21	.	.
1785	1	.	.	2	2	6	.	.	.	1	3	19	10	.
1786	5	.	4	8	8	14	.	.	.	2	24	51	34	.
1787	5	.	7	11	20	41	2	.	.	10	11	74	33	.
1788	7	7	5	8	12	18	.	.	.	16	2	62	18	.
1789	2	1	6	5	12	18	.	.	.	2	2	31	24	.
1790	.	.	2	.	8	9	.	.	.	2	.	38	.	.
1791	.	.	.	.	3	3	.	.	.	.	.	25	13	.
1792	1	.	.	2	.	3	.	.	.	2	.	33	6	.
1793	.	.	.	2	1	3	.	.	.	1	.	1	.	.

For the observations at Ratisbon, Carlsruhe, Sagan, Mannheim, Prague, Copenhagen, Stockholm, Salem, Ipswich, etc., see pp. 334 and 335.

[1] Observed by Höslin, and recorded in *Meteorologischen Beobachtungen.*

AURORAS OBSERVED IN DIFFERENT YEARS, ARRANGED ACCORDING TO LOCALITY. *Continued.*

Franeker.	The Hague.	Zwanenberg.[1]	G. Britain.	Plymouth.	Sweden.	St. Petersburg.	Abo.	Philadelphia	New Haven, etc.	Cambridge.	Years.	Solar Spots.	
.	.	3	6	6	47	29	.	.	.	4	1742		
.	.	3	4	4	47	9	.	.	.	2	1743		
.	.	1	3	2	15	1	.	.	.	.	1744		
.	1	.	2	2	20	1	.	.	.	.	1745		Min.
.	8	2	4	4	50	10	.	1	.	7	1746		
.	10	7	5	5	36	6	.	.	.	10	1747		
.	10	4	3	3	40	2	2	1	.	6	1748		
.	3	2	.	.	32	1	6	1	.	10	1749	63.8	
	12	16	3	.	27	4	12	3	.	17	1750	68.2	Max.
.	9	2	.	.	22	5	6	.	.	5	1751	40.9	
.	13	11	.	.	40	12	16	.	.	2	1752	33.2	
.	4	5	.	.	34	.	9	.	.	1	1753	23.1	
.	4	4	.	.	17	.	10	.	.	.	1754	13.8	
.	4	.	.	.	9	1	2	.	.	.	1755	6.0	Min.
.	8	.	.	.	15	1	.	.	.	.	1756	8.8	
.	8	.	.	.	.	1	1	1	.	6	1757	30.4	
.	10	1	.	.	.	1	6	.	.	4	1758	38.3	
.	.	8	.	.	51	6	13	.	.	5	1759	48.6	
.	.	.	.	.	50	10	11	.	.	6	1760	48.9	
.	.	.	.	.	48	11	15	.	.	5	1761	75.0	Max.
.	.	.	.	.	12	25	14	.	.	7	1762	50.6	
.	.	.	.	.	.	7	11	.	1	6	1763	37.4	
.	.	.	3	.	.	12	9	.	4	11	1764	34.5	
.	.	.	.	.	.	8	6	.	.	7	1765	23.0	
.	.	.	1	.	.	.	6	.	.	.	1766	17.5	Min.
.	.	.	.	.	.	4	4	.	1	3	1767	33.6	
.	.	.	.	.	.	3	7	.	4	6	1768	52.2	
.	.	.	2	.	.	10	13	1	9	16	1769	85.7	Max.
.	.	.	.	.	.	13	6	.	4	14	1770	79.4	
10	.	.	.	.	.	27	12	.	.	15	1771	73.2	
14	.	.	.	.	.	21	19	.	2	7	1772	49.2	
23	.	.	1	.	.	31	15	.	5	16	1773	39.8	
34	.	.	.	.	.	48	21	.	6	15	1774	47.6	
39	.	.	1	.	.	23?	7	.	1	5	1775	27.5	Min.
21	.	.	.	.	.	12	6	.	.	4	1776	35.2	
36	.	.	.	.	.	26	12	.	6	14	1777	63.0	
22	.	.	.	.	.	31	6	.	5	16	1778	94.8	
27	.	.	.	.	.	37	6	.	.	4	1779	99.2	Max.
4	.	.	.	.	.	19	.	.	25	.	1780	72.6	
1	.	.	.	.	.	29	.	.	25	13	1781	67.7	
4	.	.	1	.	.	30	3	.	20	21	1782	33.2	
.	.	.	.	.	.	17	1	.	14	23	1783	22.5	
.	.	.	.	.	.	7	.	.	1	4	1784	4.4	Min.
.	.	.	.	.	.	14	.	.	6	13	1785	18.3	
.	.	.	16	.	.	40	7	.	24	34	1786	60.8	
.	.	.	27	.	.	10	36	.	15	27	1787	92.8	Max.
.	.	.	53	.	.	10	20	.	19	26	1788	90.6	
.	.	.	45	.	.	15	19	.	21	21	1789	85.4	
.	.	.	36	.	.	4	22	.	3	.	1790	75.2	
.	.	.	37	.	.	.	10	.	3	.	1791	46.1	
.	.	.	23	.	.	2	13	.	1	.	1792	52.7	
.	.	.	13	.	.	2	7	.	2	2	1793	20.7	
.	.	.	6	.	.	2	.	.	1	.	1794	23.9	

[1] Observed by Huber, and recorded in *Harlemer Abhandlungen*, etc.

AURORAS OBSERVED IN DIFFERENT YEARS, ARRANGED ACCORDING TO LOCALITY. *Continued.*

Years.	Montmorenci.	Paris.	France.	Ratisbon.	Carlsruhe.[1]	Sagan.	Mannheim.	Prague.	Germany.	Jena.	G. Britain.	Copenhagen.	Stockholm, etc.
1778	12	.	20	.	.	.	.	.	16	5	.	4	.
1779	17	.	40	2	23	.	.	.	31	12	.	11	.
1780	8	.	13	1	19	.	.	.	9?	5	.	.	.
1781	16	1	16	8	12	11	26	.	53	4	.	.	.
1782	7	.	7	3	4	7	16	5	32	.	1	11	.
1783	13	2	15	8	10	13	20	12	47	5	.	11	6
1784	5	5	13	3	4	8	8	4	21	3	.	3	7
1785	2	2	6	.	.	5	13	.	19	1	.	2	19
1786	8	8	14	4	4	28	20	8	51	2	16	9	47
1787	11	20	41	14	.	33	39	13	74	10	27	10	55
1788	8	12	18	6	.	42	27	.	62	16	53	2	53
1789	5	12	18	6	6	32	10	.	31	2	45	.	57
1790	.	8	9	1	.	24	18	4	38	2	36	.	59
1791	.	3	3	1	.	15	10	1	25	.	37	.	19
1792	2	.	3	.	.	22	9	.	33	2	23	.	19
1793	2	1	3	.	.	.	.	.	1	1	13	.	.
1794	1	3	3	.	.	.	.	.	.	.	6	.	.
1795	.	2	2	.	.	.	.	.	.	.	3	.	.
1796	.	1	1	.	.	.	.	.	1	1	.	.	.
1797	3	.	.	.	.	.	.	.	.	.	13	.	.
1798	1	.	1	.	.	.	.	.	.	.	.	.	.
1799	2	2?	2?	.	.	.	.	.	1	.	2	.	.
1800	.	2	2	.	.	.	.	.	.	.	3	.	.
1801	.	.	.	.	.	.	.	.	.	.	4	.	.
1802	.	.	.	.	.	.	.	.	1	.	4	.	6
1803	.	1	1	.	.	.	.	.	.	.	6	.	.
1804	.	2	2	.	.	.	.	.	2	.	6	.	1
1805	.	1	1	.	.	.	.	.	.	.	4	.	2
1806	.	.	.	.	.	.	.	.	1	.	3	.	4
1807	.	.	.	.	.	.	.	.	1	.	.	.	2
1808	.	.	.	.	.	.	.	.	1	.	1	.	.
1809	.	.	.	.	.	.	.	.	.	.	.	.	.
1810	.	.	.	1	.	.	.	.	1	.	.	.	.
1811	.	.	.	.	.	.	.	.	.	.	.	.	1
1812	.	.	.	.	.	.	.	.	.	.	.	.	1
1813	.	.	.	.	.	.	.	.	2?	.	.	.	1
1814	.	.	.	2	.	.	.	.	2	.	3	.	.
1815	.	.	.	2	.	.	.	.	2	.	.	.	.
1816	.	.	.	1	.	.	.	.	1	.	2	.	2
1817	.	.	1	3	3	.	.	.	7	.	5	.	3
1818	.	.	.	1	.	.	.	.	1	.	2	.	1
1819	.	.	.	1	.	.	.	.	1	.	3	.	.
1820	.	.	.	.	.	.	.	.	.	.	2	.	.
1821	.	.	.	.	.	.	.	.	.	.	4	.	.
1822	.	.	1?	.	.	.	.	.	.	.	1	.	.
1823	.	.	.	.	.	.	.	.	.	.	.	.	.
1824	.	.	.	.	.	.	.	.	1	.	.	.	.

[1] The observations given by Böckmann are different. Gilbert Ann., VII. 32.

AURORAS OBSERVED IN DIFFERENT YEARS, ARRANGED ACCORDING TO LOCALITY. *Continued.*

St. Petersburg.	Spydberg.	Abo.	Cuba, etc.	New Haven.	Cambridge.	Salem.	Ipswich.	Maine.	Gothaab.	Years.	Solar Spots.	
31	.	6	.	5	16	.	.	.	.	1778	94.8	
37	.	6	.	.	4	.	.	.	.	1779	99.2	Max.
19	.	.	1	25	.	.	.	.	.	1780	72.6	
29	.	.	.	25	13	.	19	.	.	1781	67.7	
30	.	3	.	20	21	.	20	.	.	1782	33.2	
17	.	1	.	14	23	.	14	.	.	1783	22.5	
7	18	.	1	1	4	.	.	.	.	1784	4.4	Min.
14	12	.	.	6	13	.	.	.	.	1785	18.3	
40	24	7	.	24	34	41	.	.	26	1786	60.8	
10	27	36	.	15	27	33	.	.	28	1787	92.8	Max.
10	.	20	.	19	26	23	.	.	.	1788	90.6	
15	.	19	1	21	21	37	.	.	.	1789	85.4	
4	.	22	.	3	.	11	.	.	.	1790	75.2	
.	.	10	.	3	.	11	.	.	.	1791	46.1	
2	.	13	.	1	.	6	.	.	.	1792	52.7	
2	.	7	.	2	2	6	.	.	.	1793	20.7	
2	.	.	.	1	.	1	.	.	.	1794	23.9	
2	.	.	.	.	.	2	.	.	.	1795	16.5	
1	.	.	.	.	.	.	.	.	.	1796	9.4	
1	.	.	.	.	.	.	.	.	.	1797	5.6	
.	.	1	.		.	.	.	.	.	1798	2.8	Min.
1	.	.	.	.	.	.	.	.	.	1799	5.9	
.	.	.	.	.	.	.	.	.	.	1800	10.1	
.	.	2	.	.	.	.	.	.	.	1801	30.9	
1	.	5	.	1	.	1	.	.	.	1802	38.3	
.	.	3	.	3	.	4	.	.	.	1803	50.0	
3	.	7	.	2	.	4	.	.	.	1804	70.0	Max.
1	.	1	.	2	.	3	.	.	.	1805	50.0	
1	.	.	.	2	.	2	.	.	.	1806	30.0	
1	.	.	.	2	.	.	.	2	.	1807	10.0	
1	.	.	.	.	.	.	.	12	.	1808	2.2	
.	.	.	.	.	.	2	.	.	.	1809	0.8	
.	.	.	.	.	.	.	.	.	.	1810	0.0	Min.
.	.	.	.	.	.	.	.	.	.	1811	0.9	
.	.	.	.	.	.	.	.	.	.	1812	5.4	
.	.	.	.	.	.	.	.	.	.	1813	13.7	
.	.	.	.	2	.	3	.	3	.	1814	20.0	
.	.	.	.	.	.	1	.	2	.	1815	35.0	
.	.	.	.	.	.	.	.	1	.	1816	45.5	Max.
.	.	2	.	.	.	.	.	3	.	1817	43.5	
.	.	.	.	3	.	1	.	8	.	1818	34.1	
2	.	.	.	3	.	5	.	4	.	1819	22.5	
5	.	.	.	1	.	1	.	1	.	1820	8.9	
.	.	1	.	.	.	.	.	1	.	1821	4.3	
.	.	.	.	.	.	.	.	.	.	1822	2.9	
.	.	1	.	.	.	.	.	2	.	1823	1.3	Min.
2	.	4	.	.	.	.	.	.	.	1824	6.7	

For the observations at Arkhangel, see p. 337.

AURORAS OBSERVED IN DIFFERENT YEARS, ARRANGED ACCORDING TO LOCALITY. *Continued.*

Years.	Athens.	Italy.	Spain.	Switzerland.	Paris.	France.	Aix-la-Chapelle.	Bonn.	Bonn ?[3]	Germany.	Austria.	Brussels.	Netherlands.	G. Britain.	Leith and Sky.
1814	.	.	.	1	.	.	.	.	.	2	.	.	.	3	.
1815	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.
1816	.	.	.	.	.	.	.	.	.	1	.	.	.	2	.
1817	.	.	.	.	1	1	.	.	.	7	.	.	.	5	.
1818	.	.	.	.	.	.	.	.	.	1	.	.	.	2	.
1819	.	.	.	.	.	.	.	.	.	1	.	.	.	3	.
1820	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.
1821	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.
1822	.	.	.	.	1?	1?	.	.	.	.	.	.	.	1	.
1823	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1824	.	.	.	.	.	.	.	.	.	1	.	.	.	.	2
1825	.	.	.	.	.	.	.	.	.	.	.	.	.	1	8
1826	.	.	.	.	.	.	.	.	.	1	.	.	.	2	7
1827	.	.	.	.	2	2	.	.	.	.	.	.	.	10	8
1828	.	.	.	.	.	.	.	.	.	.	.	.	.	11	2
1829	.	.	.	.	.	.	.	.	.	1	.	.	.	18	8
1830	.	.	.	.	.	.	.	.	.	2	.	.	.	32	4
1831	.	3	.	.	1	1	.	.	.	4	.	1	1	23	.
1832	.	.	.	.	.	.	.	.	.	1	.	.	.	5	2
1833	.	.	.	.	1	1	.	.	.	.	.	2	.	12	1
1834	.	.	.	.	.	.	.	.	.	1	.	2	.	4	2
1835	.	.	1	.	.	2	.	.	.	2	.	1	.	5	.
1836	.	1	1	1	.	1	.	.	.	2	.	1	.	5	.
1837	.	1	.	4	7	8	.	.	.	3	.	3	.	12	.
1838	.	.	.	.	3	3	.	.	.	1	.	1	.	5	.
1839	.	3	1	.	3	4	.	4	4	4	.	4	.	18	10
1840	.	3	.	1	4	4	.	1	1	1	.	4	.	9	10
1841	.	.	.	.	3	3	.	.	2	2	.	6	.	7	.
1842	.	1	.	1	1	2	.	.	5	.	.	3	.	2	.
1843	.	2	.	.	1	2	.	4	6	4	.	4	.	24	.
1844	.	1	.	.	.	1	.	4	10	7	.	.	.	30	.
1845	.	.	1	.	1	2	.	9	13	11	.	.	1	47	.
1846	.	.	.	2	.	.	.	11	14	11	.	2	1	19	.
1847	.	1	1	1	1	6	.	9	15	12	.	5	.	26	.
1848	1	2	2	3	1	2	11	3	10	15	.	3	.	53	.
1849	.	1	.	1	1	6	5	2	5	13	.	5	.	47	.
1850	.	.	.	.	.	.	2	4	3	6	.	.	.	27	.
1851	.	.	.	1	.	.	1	3	3	8	1	1	1	60	.
1852	.	.	.	1	.	.	2	2	.	16	.	.	.	66	.
1853	.	.	.	.	.	.	.	.	.	3	1	.	.	58	.
1854	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
1855	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1856	.	.	.	.	3	3	.	.	.	4	.	.	.	.	.
1857	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
1858	.	.	.	.	1	1	.	.	.	2	.	.	.	15	.
1859	3	4	1	4	3	6	.	.	.	21	4	3	2	28	.
1860	3	.	.	.	3	4	.	.	.	24	3	1	2	5	.
1861	1	.	.	2	1	1	.	.	.	13	9	1	7	1	.
1862	2	8	.	1	1	3	.	.	.	15	.	1	9	.	.
1863	3	.	.	.	.	.	.	.	.	12	.	.	5	.	.
1864	4[1]	.	1[2]	.	.	1	.	.	.	26	.	.	1	2	.
1865	1	1	.	.	1	4	.	.	.	33	.	.	4	2	.
1866	.	2	.	.	1	1	.	.	.	2	.	.	.	8	.

[1] Greece. [2] Lisbon. [3] Schmidt's series as given by Wolf, from *Grunert's Archiv.*, S. XXVIII.

AURORAS OBSERVED IN DIFFERENT YEARS, ARRANGED ACCORDING TO LOCALITY. *Continued.*

Makerstown.	Dunse.	St. Petersburg.	Russia.	Norway.	Christiania.	Stockholm.	Sweden.	Helsingfors.	Abo.	Finland.	Hammerfest.	Arkhangel and Nova Zembla.[1]	Solar Spots.	
.	.	.	.	.	.	.	.	.	.	.	.	1	20.0	
.	.	.	.	.	.	.	.	.	.	.	.	2	35.0	
.	.	.	.	.	1	.	2	.	.	.	.	3	45.5	Max.
.	.	.	.	.	1	.	3	.	2	.	.	7	43.5	
.	.	.	.	.	.	.	1?	.	.	.	.	5	34.1	
.	.	2	2	.	.	.	.	.	.	.	.	16	22.5	
.	.	5	5	.	.	.	.	.	.	.	.	11	8.9	
.	.	.	.	.	.	.	.	.	1	.	.	.	4.3	
.	.	.	.	.	.	.	.	.	.	.	.	3	2.9	
.	.	.	.	.	.	.	.	.	1	.	.	2	1.3	Min.
.	.	2	2	.	.	.	.	.	4	.	.	.	6.7	
.	.	1	1	.	7	.	.	.	12	.	.	2	17.4	
.	.	.	.	.	.	.	.	.	11	.	.	2	29.4	
.	.	2	2	.	.	.	.	.	17	19	.	1	39.9	
.	.	1	1	.	.	.	.	.	24	22	.	4	52.5	
.	.	.	.	.	.	.	.	.	27	3	.	4	53.5	
.	.	12	12	.	1	.	.	.	34	1	.	12	59.1	Max.
.	.	5	5	.	.	.	.	.	27	9	.	13	38.8	
.	.	1	1	.	.	.	.	5	6	6	.	1	22.5	
.	.	4	4	.	.	.	.	2	8	13	.	2	7.5	Min.
.	.	2	2	.	.	.	.	.	3	4	.	11	11.4	
.	.	.	.	.	.	.	.	8	11	6	.	5	45.5	
.	.	1	1	.	.	.	.	13	14	1	.	.	96.7	
.	.	2	10	.	22	.	.	2	4	23	.	.	111.0	Max.
.	27	2	20	.	28	.	.	.	6	108	.	.	82.6	
.	38	.	8	.	30	.	.	.	3	149	.	.	68.5	
.	43	.	18	.	40	.	.	.	2	8	.	.	51.8	
.	42	4	5	.	35	.	.	.	2	.	.	.	29.7	
.	49	6	3	.	49	.	.	.	1	.	.	.	19.5	
20	10	.	1	.	38	.	.	.	6	.	.	.	8.6	Min.
30	13	.	2	.	22	.	.	1	.	.	.	.	13.0	
47	10	.	7	.	18	.	.	3	.	.	.	.	33.0	
17	16	.	11	.	39	.	.	5	.	.	.	.	47.0	
18	30	4	22	.	38	.	.	6	.	.	.	.	79.4	
26	.	2	21	.	38	.	.	1	.	.	.	.	100.4	Max.
26	.	1	5	.	43	.	.	.	.	.	.	.	95.6	
.	.	4	5	.	25?	.	.	.	.	.	1	.	64.5	
.	.	2	8	..	17	.	.	.	.	.	9	.	61.9	
.	.	.	13	.	45	.	.	.	.	.	9	.	52.2	
.	.	.	12	.	26	.	.	.	.	.	7	.	37.7	
.	.	.	6	.	35	.	.	.	.	.	12	.	19.2	
.	.	.	1	22	22	.	2?	.	.	.	8	.	6.9	
.	.	.	2	24	24	.	.	.	.	.	9	.	4.2	Min.
.	.	1	6	15	15	.	.	.	.	.	3	.	21.6	
.	.	3	12	39	39	.	.	.	.	.	8	.	50.9	
.	.	4	23	46	46	2	6	.	.	.	12	.	96.4	
.	.	5	21	34	34	13	24	.	.	.	8	.	98.6	
.	.	2	7	42	27	9	15	.	.	.	5	.	77.4	
.	.	3	4	50	27	7	10	.	.	.	.	.	59.4	
.	.	3	15	53	36	10	12	.	.	.	.	.	44.4	
.	.	1	8	32	22	7	9	.	.	.	.	.	47.1	
.	.	2	9	34	33	16	27	.	.	.	.	.		
.	.	.	.	37	27	3	10	.	.	.	.	.		

[1] The observations at Arkhangel were made by Silvestroff. See *Mém. de l'Acad. St. Petersburg*, S. 6, T. IV. et V. pp. 237 etc. See observations in Iceland and Nis'hne Kolymsk in 1820 – 3.

AURORAS OBSERVED IN DIFFERENT YEARS, ARRANGED ACCORDING TO LOCALITY. *Continued.*

Years.	Cuba, etc.	California.	Washington, etc.	Wilmington.	Philadelphia, etc.	New Haven.	Providence.	Cambridge.	Boston.	Worcester.	Newberry.	New York.	Maine.	Toronto.	Isle Jesus.
1814	.	.	.	.	.	2	.	.	.	.	.	.	3	.	.
1815	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
1816	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
1817	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.
1818	.	.	.	.	.	3	.	.	1	11 [2]	.	.	8	.	.
1819	.	.	.	.	.	3	.	.	4	.	.	.	4	.	.
1820	.	.	.	.	.	1	.	.	1	.	.	.	1	.	.
1821	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
1822	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
1823	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.
1824	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1825	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
1826	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.
1827	.	.	.	6	.	7	.	.	2	.	.	14	8	.	.
1828	.	.	.	3	.	6	.	.	.	.	.	21	2	.	.
1829	.	.	.	3	.	2	.	.	.	.	.	26	7	.	.
1830	.	.	.	16	.	4	.	.	3	.	.	80	9	.	.
1831	.	.	.	12	.	2	.	.	.	.	.	55	2	.	.
1832	.	.	.	6	.	2	1	.	.	.	.	24	.	.	.
1833	1	.	.	7	.	3	.	.	.	.	.	37	4	.	.
1834	.	.	.	.	.	9	.	.	.	.	.	35	.	.	.
1835	.	.	1	.	1	6	3	.	2	.	.	30	1	1 [3]	.
1836	.	.	.	.	.	5	6	.	1	.	5	61	2	.	.
1837	1	.	.	.	.	40	7	.	3	.	5	50	2	.	.
1838	.	.	4	.	.	39	9	.	7	.	6	42	10	.	.
1839	.	.	4	.	.	45	9	9 [1]	3	18	9	57	10	.	.
1840	1	.	5	.	.	44	8	10	2	24	8	73	4	29	.
1841	.	.	2	.	1	42	6	28	2	14	9	73	.	40	.
1842	.	.	2	.	1	11	1	9	.	12	2	35	.	22	.
1843	.	.	.	.	6	10	3	5	.	6	4	56	.	17	.
1844	.	.	.	.	2	10	2	6	.	2	2	30	.	17	.
1845	.	.	.	.	1	30	2	7	.	8	4	24	.	15	.
1846	.	.	.	.	.	22	7	14	.	7	5	47	.	38	.
1847	.	.	.	.	.	53	8	9	1	5	3	46	.	35	.
1848	2	.	.	.	.	20	14	20	1	13	16	73	6	74	.
1849	.	.	1	.	.	30	9	4	.	5	13	73	1	69	.
1850	.	.	1	.	.	21	12	14	.	6	.	90	.	50	.
1851	.	.	3	.	.	42	9	11	.	7	13	53	.	73	.
1852	.	.	.	.	.	22	15	44	.	4	10	.	.	102	36
1853	1	.	.	.	.	22	3	29	.	6	16	.	.	63	39
1854	.	.	.	.	.	15	7	26	.	12	15	.	.	54	50
1855	.	.	.	.	.	.	.	12	.	.	4	6	.	46	37
1856	.	.	.	.	.	.	1	7	.	.	5	2	.	34	34
1857	.	1	.	.	.	.	1	6	.	1	6	7	1	26	21
1858	.	1	.	.	.	.	5	24	.	14	14	.	.	59	41
1859	1	3	.	.	.	.	9	15	.	11	13	6	.	53	41
1860	1	1	.	.	.	.	3	9	.	21	12	.	.	58	42
1861	.	.	.	.	.	.	.	6	.	7	9	5	.	43	36
1862	.	.	.	.	.	.	.	.	.	9	7	.	.	48	26
1863	.	.	.	.	.	1	.	.	.	.	.	.	.	44	.
1864	.	.	.	.	.	.	.	3	.	.	.	.	.	34	.
1865	.	.	.	.	.	.	.	.	.	.	.	.	.	55	.
1866	.	.	.	.	.	.	.	13	.	.	.	.	.	44	.

[1] Dorchester. [2] Williamstown. [3] Canada.

AURORAS OBSERVED IN DIFFERENT YEARS, ARRANGED ACCORDING TO LOCALITY. *Continued.*

Montreal.	Kingston.	London.	Quebec.	Newfoundland.	Sitka.	Hudson's Bay.	Davis Strait, etc.	Winter Island.	Cumberland House.	Fort Enterprise.	Igloolik.	Fort Franklin, etc.	Winter Harbor.	Solar Spots.	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	20.0	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	35.0	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	45.5	Max.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	43.5	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	34.1	
.	.	.	.	.	.	.	.	.	8	.	.	.	16	22.5	
.	.	.	.	.	.	.	.	.	54	30	.	.	11	8.9	
.	.	.	.	.	.	.	.	21	.	86	.	.	.	4.3	
.	.	.	.	.	.	.	.	7	.	.	5	.	.	2.9	
.	.	.	.	.	.	1	.	.	.	.	3	.	.	1.3	Min.
.	.	.	.	.	.	5	.	.	12[5]	.	.	.	.	6.7	
.	.	.	.	.	.	.	4	.	22	.	Felix Harbor.	5	.	17.4	
.	.	.	.	.	.	.	.	.	.	3[6]		41	Sheriff's Harbor.	29.4	
.	.	.	.	.	.	.	.	.	.	.		8		39.9	
.	.	.	.	.	.	.	.	.	.	.		.		52.5	
.	.	.	.	.	.	.	.	.	.	.	15	.		53.5	
.	.	.	.	.	.	.	.	.	.	.	1	.		59.1	Max.
.	.	.	.	.	.	.	.	Fort Reliance.	.	.	.	.	5	38.8	
.	.	.	.	.	.	.	.		.	.	.	.		22.5	
.	.	.	.	.	.	.	.	33	.	.	.	.	.	7.5	Min.
.	.	.	.	.	.	.	.	125	.	.	.	.	.	11.4	
.	.	.	.	.	.	.	.	41	.	.	.	.	.	45.5	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	96.7	
.	.	.	.	.	.	.	.	.	Jakobshavn.	.	.	.	.	111.0	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	82.6	
.	.	.	.	.	.	.	Gothaab.	.	.	.	.	.	.	68.5	
.	.	.	.	.	.	.	.	.	10	.	Fort Simpson.	.	.	51.8	
.	.	.	.	.	.	.	60	.	15	.	.	.	.	29.7	
.	.	.	.	1[1]	8	Lake Athabasca.	93	.	15	.	.	.	Repulse Bay.	19.5	
.	.	.	.	.	5	21	84	.	18	Fort Confidence.		.		8.6	Min.
.	.	.	.	.	7	25	87	.	12		22	.		13.0	
.	.	.	.	.	5	.	74	.	24		.	.	.	33.0	
.	.	.	.	.	.	.	32	.	21		.	.	23	47.0	
.	.	.	.	.	13	.	.	.	17		.	.	16	79.4	
41	62	33	52	.	1	.	.	.	14	63	.	.	.	100.4	Max.
27	29	26	45	48	4	.	27[2]	V. R. Harbor.	11	56	8	.	7[8]	95.6	
38	28	30	44	52	8	25	.		21	37	22	47	21	64.5	
22	19	18	28	51	.	57	.		7	38	42	.	24	61.9	
30	40	15	60	20	9	.	.		.	.	106	6[7]	.	52.2	
.	.	.	.	.	.	.	.	10	.	.	75	.	.	37.7	
.	.	.	.	.	.	.	.	8	.	.	.	.	.	19.2	
.	.	.	.	.	.	.	.	2	.	.	.	.	.	6.9	
.	.	.	.	.	4	.	.	.	.	.	.	.	.	4.2	Min.
.	.	.	.	.	3	.	15[3]	.	.	.	.	.	.	21.6	
.	.	.	.	.	16	.	50	.	.	.	.	.	.	50.9	
.	.	.	.	.	11	.	.	17[4]	.	.	.	.	.	96.4	
.	.	.	.	.	3	.	.	.	.	.	.	.	.	98.6	Max.
.	.	.	.	.	1	.	.	.	.	.	.	.	.	77.4	
29	.	.	.	.	.	.	.	.	.	.	.	.	.	59.4	
7	.	.	.	.	3	.	.	.	.	.	.	.	.	44.4	
12	.	.	.	.	3	.	.	.	.	.	.	.	.	47.1	
5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	

[1] Lake Superior.
[2] Fort Norman.
[3] In Lat. 75°.
[4] Port Kennedy.
[5] Port Bowen.
[6] Behring Sea.
[7] Northumberland Sound.
[8] Lancaster Sound, etc.

LXXIX. AURORAS ARRANGED ACCORDING TO YEARS, ZONES, AND HEMISPHERES.

WOLF'S CATALOGUE.								LOVERING'S CATALOGUE.									
Lat. 0°–46°.	Switzerland.	Lat. 46°–55°.	Lat. 55°–Polar Circle.	Europe.	Total.	Solar Spots.	Years.	Lat. 0°–46°.	Lat. 46°–55°.	Lat. 55°–P. C.	Lat. P. C.–90°.	Europe.[1]	Lat. 0°–46°.	Lat. 46°–55°.	Lat. 55°–P. C.	Lat. P. C.–90°.	America.	Total.
.	.	.	.	.	.		1700	1	.	.	.	1	.	.	.	.	.	.
.	.	.	.	.	.		1701	.	.	.	.	.	.	.	.	.	.	1
.	.	.	1	1	1		1702	.	.	1	.	1	.	.	.	.	.	1
.	.	.	.	.	.		1703	.	.	.	.	.	.	.	.	.	.	.
.	1	1	1	3	3		1704	.	1	.	.	1	.	.	.	.	.	1
.	1	.	.	1	1	Max.	1705	.	.	.	.	.	.	.	.	.	.	.
.	.	1	.	1	1		1706	.	1	.	.	1	.	.	.	.	.	1
.	.	9	7	15	15		1707	.	8	8	.	16?	.	.	.	.	.	16
.	.	6	1	7	7		1708	.	3	1	.	4	.	.	.	.	.	4
.	2	4	.	6	6		1709	.	3	.	.	3	.	.	.	.	.	3
.	.	3	.	3	3		1710	.	3	.	.	3?	.	.	.	.	.	3
.	1	2	.	2	2		1711	.	1	.	.	1	.	.	.	.	.	1
.	.	1	.	1	1	Min.	1712	.	.	.	.	.	.	.	.	.	.	.
.	.	2	.	2	2		1713	.	.	.	.	.	.	.	.	.	.	.
.	1	.	.	1	1		1714	.	1	.	.	1	.	.	.	.	.	1
1	.	1	.	1	1		1715	.	.	.	.	.	.	.	.	.	.	.
1	3	16	3	19	19		1716	.	15	2	.	15	.	.	.	.	.	15
.	.	16	4	18	18	Max.	1717	.	14	3	.	17	.	.	.	.	.	17
.	2	22	11	30	30		1718	1	18	9	.	29	.	.	.	.	.	29
3	4	39	3	41	41		1719	3	26	.	.	34?	2	.	.	.	2	36
1	.	30	2	33	33		1720	2	26	1	.	31	1	.	.	.	1	31
.	3	26	5	29	29		1721	.	23	.	.	24	.	.	.	.	.	24
1	.	44	14	59	59		1722	1	55?	.	.	56	.	.	.	.	.	56
1	.	25	17	37	37	Min.	1723	1	23	11	.	35	.	.	.	.	.	35
.	.	16	15	27	27		1724	.	15	10	.	27	.	.	.	.	.	29
.	.	16	24	32	32		1725	.	21	12	.	34	.	.	.	.	.	34
3	1	44	19	55	55		1726	1	40	16	.	49	.	.	.	.	.	49
12	1	26	50	72	94	Max.	1727	12	18	46	28	90	.	.	.	.	.	90?
10	.	59	59	101	112		1728	10	43	49	19	111	2	.	.	.	2	111
.	.	33	42	69	73		1729	.	35	37	8	73	.	.	.	.	.	75
13	3	52	89	130	130		1730	11	53	90	1	109	1	.	.	.	1	119
3	.	34	46	68	68		1731	2	28	47	.	67	1	.	.	.	1	68
4	.	32	85	103	103		1732	5	72	87	.	134	.	.	.	.	.	134
1	.	19	15	35	35	Min.	1733	1	51	7	.	58	.	.	.	.	.	58
1	.	18	27	44	44		1734	1	77	38	.	107	.	.	.	.	.	107
3	.	39	33	67	67		1735	3	55	35	.	96	.	.	.	.	.	96
6	.	32	25	54	56		1736	6	62	51	.	110	.	.	.	.	.	110
10	1	32	11	45	55		1737	11	50	50	.	109	2	.	.	.	2	109
3	.	21	.	24	24	Max.	1738	3	44	23	.	67	.	.	.	.	.	67
4	.	42	35	74	75		1739	4	54	56	.	106	3	.	.	.	3	107
2	.	21	35	54	54		1740	1	8	44	.	50	.	.	.	.	.	50

[1] The auroras observed in every part of the Eastern continent are included under this designation.

AURORAS ARRANGED ACCORDING TO YEARS, ZONES, AND HEMISPHERES. *Continued.*

WOLF'S CATALOGUE.								LOVERING'S CATALOGUE.									
Lat. 0°–46°.	Switzerland.	Lat. 46°–55°.	Lat. 55°–Polar Circle.	Europe.	Total.	Solar Spots.	Years.	Lat. 0°–46°.	Lat. 46°–55°.	Lat. 55°–P. C.	Lat. P. C.–90°.	Europe.	Lat. 0°–46°.	Lat. 46°–55°.	Lat. 55°–P. C.	Lat. P. C.–90°.	America.	Total.
3	.	46	76	108	108		1741	3	34	95	.	129	5	.	.	.	5	129
.	.	42	44	81	81		1742	.	28	65	.	87	4	.	.	.	4	90
1	.	32	47	75	75		1743	1	18	56	.	69	2	.	.	.	2	69
1	1	13	18	28	28		1744	1	12	15	.	28?	.	.	.	.	1	37?
2	.	8	27	27	27	Min.	1745	2	14	20	.	36	.	.	.	.	.	36
.	.	17	57	71	73		1746	.	38	50	.	84	8	2	.	.	8	90
3	.	20	33	38	38		1747	3	45	20	.	64	10	.	.	.	10	72
1	.	17	50	58	59		1748	1	42	32	.	74	6	.	.	.	6	79
3	.	10	7	17	75	63.8	1749	3	34	32	.	66	11	1	.	.	12	71
7	1	27	16	29	121	68.2	1750	6	43	27	.	67	17	.	.	.	17	73
1	.	13	57	70	70	40.9	1751	1	28	22	.	50	5	.	.	.	5	53
.	.	19	39	53	53	33.2	1752	.	41	40	.	76	2	.	.	.	2	76
.	.	11	39	47	47	23.1	1753	.	18	34	.	51	1	.	.	.	1	51
.	.	12	25	37	37	13.8	1754	.	39	17	.	56	.	.	.	.	.	56
2	.	8	28	34	34	6.0	1755	2	22	11	.	35	.	.	.	.	.	35
.	.	7	15	15	15	8.8	1756	.	20	15	.	35	.	.	.	.	.	35
.	.	4	2	6	7	30.4	1757	.	31	1	.	32	6	.	.	.	6	37
.	.	1	.	1	1	38.3	1758	.	21	1	5	27	4	.	.	.	4	31
.	1	22	44	66	66	48.6	1759	.	3	53	.	54	5	.	.	.	5	57
.	.	11	54	64	64	48.9	1760	.	.	58	.	58	6	.	.	.	6	62
.	1	20	49	68	69	75.0	1761	.	2	53	.	56	5	.	2	.	7	58
.	.	16	34	50	50	50.6	1762	.	3	33	.	36	7	.	.	.	7	39
.	.	2	4	5	5	37.4	1763	.	2	8	.	10	6	.	.	.	6	16
.	.	4	4	6	6	34.5	1764	.	1	13	.	15	12	.	.	.	12	26
.	.	1	3	4	6	23.0	1765	.	.	8	.	9	7	.	.	.	7	17
.	.	.	.	.	.	17.5	1766	.	1	.	.	1	.	.	.	.	.	1
1	.	3	1	5	5	33.6	1767	1	.	4	.	5	4	.	.	.	4	9
.	2	12	1	14	15	52.2	1768	.	4	9	.	13	7	.	2	.	9	20
.	.	46	11	51	61	85.7	1769	1	11	31	1	38	19	.	.	.	19	55
2	3	20?	13	31	31	79.4	1770	.	30	12	.	38	14	.	.	.	14	45
.	2	7?	31	36	47	73.2	1771	.	34	27	.	56	15	.	.	.	15	65
1	1	5?	35	38	46	49.2	1772	6	30	22	.	50	10	.	.	.	10	60
1	1	25	46	58	58	39.8	1773	8	46	32	.	69	18	.	.	.	18	90
.	.	24	56	65	65	47.6	1774	13	48	50	.	87	19	.	.	.	19	101
.	.	7	21	22	22	27.5	1775	.	45	23	.	61	5	.	.	.	5	63
1	.	4	12	15	15	35.2	1776	.	31	12	.	40	4	.	.	.	4	40
1	2	40	26	42	74	63.0	1777	2	67	25	.	78	15	.	.	.	15	81
2	1	28	30	48	48	94.8	1778	6	66	33	.	81	18	.	.	.	18	89
6	5	92	.	93	93	99.2	1779	8	107	44	.	129	4	.	.	.	4	130
5	3	29	.	40	42	72.6	1780	5	24	20	.	49	26	.	.	.	26	63

AURORAS ARRANGED ACCORDING TO YEARS, ZONES, AND HEMISPHERES. *Continued.*

WOLF'S CATALOGUE.								LOVERING'S CATALOGUE.									
Lat. 0°–46°.	Switzerland.	Lat. 46°–55°.	Lat. 55°–Polar Circle.	Europe.	Total.	Solar Spots.	Years.	Lat. 0°–46°.	Lat. 46°–55°.	Lat. 55°–P. C.	Lat. P. C.–90°.	Europe.	Lat. 0°–46°.	Lat. 46°–55°.	Lat. 55°–P. C.	Lat. P. C.–90°.	America.	Total.
7	.	61	.	64	66	67.7	1781	6	64	29	.	86	39	.	.	.	39	100
5	1	54	10	60	60	33.2	1782	3	44	34	.	66	43	.	.	.	43	91
5	2	68	29	85	85	22.5	1783	4	65	22	.	76	29	.	.	.	29	90
4	1	47	22	69	69	4.4	1784	9	32	28	.	65	5	.	.	.	5	67
.	.	42	32	67	77	18.3	1785	3	36	37	.	66	16	.	.	.	16	76
10	2	100	73	121	140	60.8	1786	4	104	82	.	149	56	.	.	26	77	176
21	11	112	84	156	174	92.8	1787	28	106	73	.	151	53	.	.	28	78	182
10	13	114	62	159	159	90.6	1788	13	121	63	.	153	41	.	.	.	41	164
3	5	100	69	140	140	85.4	1789	4	101	66	.	131	51	.	.	.	51	159
.	2	77	63	87	87	75.2	1790	.	79	64	.	119	13	.	.	.	13	123
2	.	76	18	88	88	46.1	1791	1	70	23	.	86	13	.	.	.	13	86
2	.	58	21	75	75	52.7	1792	2	50	21	.	77	7	.	.	.	7	82
.	.	15	.	15	15	20.7	1793	.	17	3	.	20	8	.	.	.	8	23
.	.	8	2	8	8	23.9	1794	.	9	2	.	11	1	.	.	.	1	12
.	.	6	2	6	6	16.5	1795	.	3	2	.	5	2	.	.	.	2	7
.	.	2	1	2	2	9.4	1796	.	2	1	.	3	.	.	.	.	.	3
.	.	13	.	13	13	5.6	1797	.	14	1	.	15	.	.	.	.	.	15
.	.	1	1	2	2	2.8	1798	.	1	1	.	2	.	.	.	.	.	2
.	.	5	1	6	6	5.9	1799	.	4	2	.	6	.	.	.	.	.	6
.	.	6	.	6	6	10.1	1800	.	6	.	.	6	.	.	.	.	.	6
.	.	8	4	12	12	30.9	1801	.	5	4	.	9	.	.	.	.	.	9
.	.	2	6	8	8	38.3	1802	.	5	7	.	12	1	.	.	.	1	14
.	.	1	1	2	2	50.0	1803	.	7	.	.	7	5	.	.	.	5	10
.	.	4	3	4	4	70.0	1804	.	9	2	.	10	4	.	.	.	4	12
.	1	23	2	23	23	50.0	1805	.	6	2	.	20	4	.	.	.	4	22
.	1	3	4	4	4	30.0	1806	.	6	1	.	7	4	.	.	.	4	11
.	.	2	2	3	3	10.0	1807	.	1	2	.	6	4	.	.	.	4	6
.	.	1	.	1	1	2.2	1808	.	2	1	.	3	12	.	.	.	12	13?
.	.	.	.	.	.	0.8	1809	.	.	1	.	1	2	.	.	.	2	3
.	.	1	.	1	1	0.0	1810	.	1	.	1	2	.	.	.	.	.	2
.	.	.	1	1	1	0.9	1811	.	.	.	4	4	.	.	.	.	.	4
.	.	.	1	1	1	5.4	1812	.	.	.	.	.	.	.	.	.	.	.
.	.	2	.	2	2	13.7	1813	.	2	.	.	2	.	.	.	.	.	2
.	2	6	1	7	34	20.0	1814	.	7	.	.	7	4	.	.	.	4	9
.	.	2	2	2	2	35.0	1815	.	2	.	3	5	3	.	.	.	3	5
.	.	2	5	5	3?	45.5	1816	.	2	2	.	4	1	.	.	.	1	5
.	1	11	7	15	20	43.5	1817	.	9	13	.	22	2	.	.	.	2	26
.	.	4	5	8	18	34.1	1818	.	2	3	1	6	18	.	.	.	18	31
.	1	9	16	18	47	22.5	1819	.	9	2	.	10	9	10	.	16	33	41
.	.	4	11	12	115	8.9	1820	.	2	20	.	25	2	46	30	11	86	103

AURORAS ARRANGED ACCORDING TO YEARS, ZONES, AND HEMISPHERES. *Continued.*

WOLF'S CATALOGUE.								LOVERING'S CATALOGUE.									
Lat. 0°–46°.	Switzerland.	Lat. 46°–55°.	Lat. 55°–Polar Circle.	Europe.	Total.	Solar Spots.	Years.	Lat. 0°–46°.	Lat. 46°–55°.	Lat. 55°–P. C.	Lat. P. C.–90°.	Europe.	Lat. 0°–46°.	Lat. 46°–55°.	Lat. 55°–P. C.	Lat. P. C.–90°.	America.	Total.
.	.	2	1	2	131	4.3	1821	.	3	1	41	45?	.	.	107	2	107	135
.	.	2	3	3	36	2.9	1822	.	1	3	19	22	1	.	7	5	13	35
.	.	.	2	2	7	1.3	1823	.	.	1	2	3	2	.	1	4	5	10
.	.	.	6	6	28	6.7	1824	.	1	7	.	8	.	.	5	12	17	23
.	.	2	25	25	55	17.4	1825	.	2	20	.	22	2	.	7	24	33	53
.	.	9	21	25	64	29.4	1826	.	5?	12	.	13	3	.	43	1	45	57
.	2	16	28	34	61	39.9	1827	.	20	43	.	58	17	.	8	.	25	76
.	.	12	33	39	59	52.5	1828	.	14?	45	.	53	25	.	1	.	26	77
.	.	20	44	54	97	53.5	1829	.	23	32	.	53	31	.	4	15	43	95
.	.	28	95	105	148	59.1	1830	.	37	36	.	64	87	.	.	3	87	139
3	1	14	40	47	95	38.8	1831	3	27	37	.	48	55	.	.	5	56	95
.	.	6	6	11	33	22.5	1832	.	7	6	1	14	27	.	.	1	28	45
.	.	8	4	12	75	7.5	1833	.	13	15	2	25	43	.	34	.	71	90
.	.	4	2	5	154	11.4	1834	.	6	3	12	18	42	.	125	.	153	158
1	.	6	8	12	73	45.5	1835	1	4	12	6	18	32	.	41	.	66	77
1	4	13	12	22	96	96.7	1836	1	8	14	.	16	68	.	.	.	68	85
2	8	20	28	42	101	111.0	1837	2	17	49	.	60	69	.	1	.	70	105
.	.	5	41	44	134	82.6	1838	.	8	42	107	125	61	.	.	.	61	154
4	2	23	50	63	190	68.5	1839	3	12	47	146	164	83	.	.	.	83	208
14	3	18	48	60	145	51.8	1840	4	8	52	8	58	106	.	.	10	110	144
1	2	33	40	61	151	29.7	1841	.	23	41	.	63	112	.	60	15	155	174
5	1	13	49	60	105	19.5	1842	1	7	61	.	68	64	1	93	15	150	178
2	.	22	53	62	119	8.6	1843	2	9	51	.	61	70	.	103	18	155	172
1	.	27	49	61	94	13.0	1844	1	9	49	.	53	50	.	128	12	165	177
.	.	18	61	71	118	33.0	1845	1	13	59	.	63	61	.	74	24	126	159
.	3	25	58	76	140	47.0	1846	.	18	54	.	67	91	.	32	38	145	169
3	1	32	60	74	127	79.4	1847	.	30	68	.	86	72	.	.	29	98	146
6	3	40	60	80	198	100.4	1848	2	46	65	.	90	153	58	.	72	191	224
2	2	24	56	64	217	95.6	1849	.	32	57	.	77	161	71	32	74	240	251
5	.	10	22	31	169	64.5	1850	.	29	36	1	58	179	63	63	59	287	291
.	1	20	17	34	74	61.9	1851	.	72	19	9	81	144	118	98	41	319	319
2	3	31	44	63	126	52.2	1852	.	85	60	9	117	160	160	254	6	283	296
.	.	20	26	32	102	37.7	1853	.	82	24	7	89	105	15	104	10	190	214
2	.	5	36	39	61	19.2	1854	.	1	40	12	50	94	.	.	8	102	117
.	1	.	32	23	53	6.9	1855	.	.	22	8	29	72	.	.	2	74	90
3	4	2	20	27	36	4.2	1856	.	7	26	9	40	37	.	.	.	37	70
.	.	1	16	16	21	21.6	1857	.	3	21	3	22	35	.	.	15	48	59
.	.	11	38	45	49	50.9	1858	.	13	68	8	72	72	.	.	50	103	139
14	3	33	50	70	82	96.4	1859	8	47	64	12	95	79	1	13	17	94	136
9	1	19	44	58	75	98.6	1860	2	27	61	8	85	82	.	17	.	89	139
1	3	23	21	48	50	77.4	1861	1	25	49	5	77	70	?	1	.	71	122
.	.	.	.	.	.	59.4	1862	7	14	56	.	78	59	.	.	.	67	126
.	.	.	.	.	.	44.4	1863	3	12	68	.	80	37	.	3	.	49	108
.	.	.	.	.	.	47.1	1864	5	29	48	.	72	30	.	3	.	33	96
.	.	.	.	.	.		1865	4	34	57	.	85	66	.	.	.	66	124
.	.	.	.	.	.		1866	2	7	39	.	44	41	.	.	.	41	77
.	.	.	.	.	.		1867	.	.	.	.	.	18	.	.	.	18	18
.	.	.	.	.	.		1868	.	.	.	.	.	6	.	.	.	.	6

Is it proved, as yet, that years of sun-spots are years of auroras any more satisfactorily than the theory is proved that years of fire-balls are years of sun-spots, as Ritter suggested,[1] or the theory that years of earthquakes are years of auroras? A lesson of caution against hasty conclusions on subjects of such complexity may be drawn from the fact, that whereas Boué[2] favored the conclusion that the aurora goes hand in hand with the earthquake, and whereas Wolf had decided, though from data afterwards acknowledged to be insufficient, that years rich in sun-spots corresponded to years rich in earthquakes, Kluge,[3] from a more searching examination and the use of larger materials, finds a periodicity for earthquakes as long as that which governs the sun-spots and magnetic disturbances, but with maxima and minima reversed.

Fritz[4] has recently investigated the periodicity of the aurora in relation to the frequency of lightning, and of the precipitation of rain or snow, and the amount of the fall, and comes to the following conclusion: —

"Obige Zusammenstellungen ergeben uns somit das Resultat, dass weder in Bezug auf den Wechsel der jahrlich beobachteten Anzahl Gewitter für wenige oder viele über die Erde verbreiteter Orte, noch für die in ähnlicher Zusammenstellung untersuchten Mengen von Niederschlägen, sich irgend ein regelmässiger periodischer Wechsel zu erkennen gibt, am wenigsten ein solcher, welcher in der Weise mit der Häufigkeit der Polarlichter harmonirt, dass man auf irgend welche Wechselbeziehung zwischen den ersten beiden Erscheinungen einerseits und den Polarlichtern andrerseits schliessen könnte. Obige Zusammenstellungen zeigen recht deutlich, wie wenig zulässig Schlüsse in der Meteorologie sind, die aus einzelnen Beobachtungen gezogen werden, wie dieses bei der grossen Nordlichtperiode von 1859 bezüglich der vorhergehenden Jahre geschehen."

Some importance has been attached to the supposed resemblance between the *solar corona*, the *zodiacal light*, and the *aurora*, when they are examined through the spectroscope, as proving an identity of nature in the phenomena. Such an identity, if fully established, would prove nothing more than this: that there existed in the earth's atmosphere, or in whatever other region of space might be the scene of auroral manifestations, the same materials as pervaded the luminous atmosphere of the sun. That the sun had any influence in setting them on fire, and that there was any connection between their incandescence and the fluctuations in the sun's light or heat, would require the same proof as ever. Moreover, the observations made on the aurora with the spectroscope utter an uncertain sound. Angstrom finds this spectrum discontinuous, whereas Winlock observes in it, at least in that of the eastern and western arch of the aurora, perfect continuity.

[1] Gilbert. Annalen der Physik, XVI. 221.

[2] Sitzungsberichte der Kais. Acad. der Wissensch. XXII. 435.

[3] Vierteljahrsschrift der Naturforsch. Gesellschaft in Zürich, IX. 267.

[4] Vierteljahrsschrift der Naturforsch. Gesellschaft in Zürich, XIII. 369.

I have failed to discover any connection between the *secular* changes in the earth's magnetism and the *secular* periodicity of the aurora. The comparison is an imperfect one, inasmuch as, in the aurora, it pertains exclusively to the frequency of the displays, without any regard to their magnitude, and, in terrestrial magnetism, it only embraces the single element of declination. The secular periodicity of the aurora is mainly the same for the whole earth, both as to the length of the period and the times of maxima and minima. This is not the case with the secular changes in the declination of the magnetic needle. Columbus remarked on September 13, 1492, that "$2\frac{1}{2}°$ east of the island of Corvo" (one of the Azores) "the magnetic variation changed and passed from N. E. to N. W."* Although the line of no variation moved through an angle of 80° in longitude, in the course of one hundred and fifty years, on the parallel of Paris, at the Azores it appears to have been stationary for the long interval between 1492 and 1600.† Moreover, the invariability of the declination, for a long period, at Spitzbergen, in New Holland, and among the Antilles, indicates changes in the earth's magnetism which affect different places very unequally.

On the eastern continents, the needle reached its extreme westerly position about 1800, viz., in 1815 at London, in 1814 at Paris, and in 1791 at the Cape of Good Hope. It was near the extreme easterly limit of its oscillation in 1580 at London, and also at Paris. During this long interval of about two hundred and twenty years, the magnetic meridian of London has swept over an angle of $35\frac{3}{4}°$, and that of Paris over an angle of nearly $34\frac{1}{2}°$. From the report made to the superintendent of the United States Coast Survey, in 1855, by Mr. Charles A. Schott,‡ it appears that the minimum westerly declination in the United States of America was, on the average of all the stations discussed, in the year 1798. The maximum westerly variation was about the year 1679. Therefore the minimum westerly declination here occurred at nearly the same time as the maximum westerly in Europe. But the range of motion at the three places which entered into Mr. Schott's discussion did not exceed 6°. In this particular, a broad distinction is indicated between the two hemispheres. The greatest yearly change occurred about 1741, and again about 1850. If we compare with these average values the particular ones which Mr. Schott has obtained for individual places, extending over a wide geographical area, we discover differences,

* Humboldt's Cosmos, translated by Otté, I. 174; and II. 657.

† Quetelet thinks that, in the time of Aristotle, it may have been 24° east of the meridian of Greenwich. Bull. de l'Acad. Brux., XXI. 303.

‡ United States Coast Survey Report, 1855, pp. 315, 337.

depending upon locality, which seem to have no parallel in the secular periodicity of the aurora.* A secondary period of about eighty-eight years, within the larger one, with a range of only $\frac{1}{15}$ of the value of the principal oscillation, has been indicated by a close scrutiny of the observations made at some stations, but the length, epoch, and range of this subordinate oscillation vary with the locality.† The best knowledge of the present day, therefore, furnishes no foundation for the inference, that, because terrestrial magnetism undergoes secular changes, and also the frequency in auroral displays, the two classes of phenomena have a parallelism, not to say some connection with each other. Such a connection Ussher‡ seems to have hinted at many years ago when he calls attention to the fact of a chasm in the auroral records about 1661 for forty years, compared with the years which preceded and followed, and to that other fact that during this period of vacancy the declination of the magnetic needle at Paris became zero. The curve of *no variation* (*or declination*) passed through London about 1660, through Paris about 1663, through the Cape of Good Hope between 1605 and 1609. If this event produced any effect whatever upon the recurrence of the aurora, we should expect that effect to antedate by fifty years, at some places, the period of its occurrence at other places. Nothing but negative evidence on this subject can be found. But what we know of the aurora during the last hundred years assures us that the periods of the secular maxima and minima are, to a great degree, independent of geographical locality. If the magnetic poles of the earth are moving, and consequently the magnetic latitudes of places are changing, we can easily imagine that such a change would have some influence on the frequency of auroras. But no motion of the magnetic poles has been discovered, which, in itself or in its effects, conforms, in period, to the well-established secular variations in the aurora. These variations evidently depend upon some cause which operates alike, and nearly simultaneously, over remote continents. De la Rive remarks: "Nous concevons donc facilement que le déplacement des glaces polaires, joint à celui du pôle magnétique de la terre, ait pu déterminer momentanément des conditions peu favorables à l'apparition de l'aurore boréale. Une chose assez remarquable, c'est que cette longue période sans aurore boréale coïncide avec l'époque où l'aiguille aimantée était exactement dirigée dans le méridien terrestre (année 1662)."§ As equally decided minima in the frequency of auroras occurred in the middle of the last

* United States Coast Survey Report, 1859, p. 299.

† United States Coast Survey Report, 1858, pp. 193, 194.

‡ Transactions of the Irish Academy, 1788, II. 191.

§ Traité d'Électricité, III. 304.

century and in the earlier part of the present century (allowance being made for the increased number of observers and the multiplicity of records), without a similar cause existing, another explanation seems to be required for this periodicity.

Some connection between the aurora and the indications of the barometer was hinted at many years since by Madison.* Recently, the discussion of long series of barometrical observations, in a particular way, has revealed a period of fifty-six or sixty years.† But this periodicity will not help us to explain the secular periods of the aurora. Of little avail, also, for this purpose, have proved those secular changes in temperature which the delicate scrutiny of multiplied observations manifests: for example, the oscillation between warm winters and cold winters in a period of about forty-one years, the cold reaching its height in 1830, and again (by prediction) in 1871.‡

* Philosophical Transactions of Philadelphia, II. 142. Trans. Irish Academy, II. 71, 72.

† Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich, VIII. 106.

‡ Wochenschrift für Astronomie, Méteorologie, etc., IV. 162.

ERRATA ET ADDENDA.

It was intimated, on page 12, that Mairan had been, probably, led into some mistakes and had duplicated some auroras by reducing again to *new style* dates which were originally given in *new style*. The following cases are sufficiently clear.

The aurora of March 17, 1707, is the same as that of March 6.

The aurora of December 7, 1710, is the same as that of November 26.

The aurora of May 1, 1716, is the same as that of April 20.

The auroras of May 2, 3, 4, and 5 should be changed to April 21, 22, 23, and 24.

The aurora of March 15, 1718, is the same as that of March 4.

The auroras of March 5 and 6, 1719, are the same as those of February 22 and 23.

The aurora of April 9 is the same as that of March 29.

The aurora of April 18 is the same as that of April 7.

The aurora of October 27 is the same as that of October 16.

The aurora of November 14 is the same as that of November 3.

The aurora of November 17 is the same as that of November 6.

The aurora of November 24 is the same as that of November 13.

The aurora of December 1 is the same as that of November 20.

The auroras of April 10, September 25, October 30, November 22, should be carried back by 11 days.

The aurora of February 26, 1720, is the same as that of February 15.

The aurora of December 10 is not found in Frobes.

The date of September 23?, 1721, should be changed to September 28.

Mairan has not altered Frobes's dates for February, 1721, but all the others for 1721, and all for 1722 and 1723, have been advanced by 11 days, as if they had been given by Frobes in *old style*. There is no obscurity in the matter after January 1, 1724.*

Is the aurora of January 20, 1728, in Frobes's work?

The auroras which Frobes and Mairan assign to April 6, 9, 10, and 11, 1717, are probably the same as those of January 6, 9, 10, and 11 of that year. See Mém. de l'Acad. Paris, 1717, p. 3.

There are some discrepancies between the dates of auroras given by Dalton in his *Meteorological Observations and Essays* and his record in the *Manchester Memoirs*, Vol. V. p. 666, &c.

On page 23, for 1757 read 1657.

On page 25, note 9, for *II.* 566 read *I.* 566.

On page 26, the aurora which Boué assigns to November 3, 1719, is probably the same as that of November 14.

On page 26, I have given the date of December 22, 1719, to the first aurora seen in New England, on the assumption that the date of December 11, as given in the Mass. Coll. and by Felt, is in *old style*. I should add that Trumbull and Holmes place this aurora on December 17.

On page 27, against the aurora at Lynn, for *September* 23, 1721, read *September* 28.

On page 29, against the auroras at Upsal, for *September* 6, 9, *and* 11, 1725, read *February* 6, 9, *and* 11. Acta Lit. Sueciæ., II. 141.

* For auroras of 1719, see Rozier, Observ. sur la Physique, XV. 134.

On page 31, Pilgram's authority is for *March* 1, 1728, and not *March* 2.

On page 34, Pilgram's name should be attached to the observation of *September* 15, 1729, instead of *September* 20.

On page 35, the aurora for October 23, 1730, recorded by Mairan, is repeated out of its place; also, against Plymouth, for *October* 6 read *October* 8.

On page 36 against October 2, 1731, and elsewhere against January 9 and August 22, 1737, April 9, June 2, September 23, 1739, also against April 6, 1741, for *Kahn* read *Kalm*.

On page 39, for *September* 2, 1733, read *October* 2. Thompson's authority belongs to *February* 22, 1734, and not to *February* 23. Strike out November 27 and 29, 1733.

On page 49, for *June* 13, 20, and 27, 1744, read *August* 13, 20, and 27. It is doubtful whether the aurora at Tubingen of *June* 13, 1745, may not belong to *June* 13, 1744, and that of *January* 9, 1746, to *January* 9, 1745.

On page 52, the aurora of January 23, 1750, is probably given in *old style*.

On page 59, add to the aurora of October 28, 1768, the places where it was seen, viz., *Rome* and *Vienna*, and the authority, viz., *Cotte*.

On page 61, in the aurora ascribed to Franeker, for *December* 4 read *December* 5.

On page 66, last line, for *February* 19 read *April* 9.

On page 67, the aurora given by Cotte for December 6, 1777, is quoted as on December 5 in the *Connaiss. de Tems* for 1781, p. 390.

On page 71, the aurora of *November* 27, 1779, observed at Gurzelen, should be changed to *December* 6. In aurora of February 29, 1780, transfer the reference of note 5 from *Geneva* to *Berne*. Strike out the aurora of November 16, 1780, at St. Petersburg.

On pages 72, &c., many of the auroras recorded for the years 1781 – 1792 are extracted from the volumes entitled *Ephem. Soc. Meteor. Palat.*

On page 72, against the aurora at Montmorenci, for *April* 15, 1781, read *April* 25.

On page 78, against the aurora at Cambridge, by Williams, for *October* 5, 1785, read *October* 6.

On page 79, against the aurora at Salem, for *March* 35, 1786, read *March* 25. On the last line of left column, for 1 read *March* 1.

On page 81, all the observations assigned to *September* 18, 1786, should be transferred to *September* 19. The observation at Montmorenci, on May 30, is out of place.

On page 87, the query against Sagan should be transferred from *April* 1, 1788, to *April* 26. The reference against Cassini on March 28 is incorrectly printed.

On page 94, left-hand note, for *fur.* read *für*.

On page 95, the aurora of October 13, 1792, is duplicated at New Haven.

On page 96, in note 8, add to *Journ. de Physique* the volumes, viz., Vol. XLIX. pp. 235 and 301, and succeeding volumes. For the auroras of July 23 and September 3, 1799, refer also to *Connaiss. de Tems*, 1803, p. 511.

On page 97, to the observations on October 22, 1804, add the place, viz., Sweden.

On page 98, in note 6, for *Aurora l'Phenom.*, read *Auroral Phenom.* For the observations made at the Paris Observatory in the years 1803 – 1805, see *Connaiss. de Tems*, 1806 – 1807, p. 498; 1808, p. 498; and 1809, pp. 498, 499.

On page 98, against Salem, for *January* 31, 1814, read *February* 28.

On page 99, add to March 15 and 16, 1817, Baylies's authority, and for *Amer. Journ. Sci., XVI.*, read *Amer. Journ. Sci., XIV.* 103. Also, on this page, against Salem, for *September* 26, 1816, read *September* 26, 1815.

On page 102, against December 19, 1820, for *Enterprise* read *Enterprize.*

On page 104, in note 4 on right hand, for *Annals of Phil.* read *Phil. Mag.*

On the same page, in note 7 on left hand, add to the auroras seen at Port Bowen, "*two in October, five in November, and seven in December, or forty-seven in all.*" Journ. of a Third Voyage, &c., 69.

On page 108, for 29 read "29.

On page 110, to aurora of September 13, 1830, observed at St. Petersburg, add this reference: *Recueil d'Observ. Magnet. à St. Petersburg*, p. 679.

On page 110, 113, 116, and 120, in the notes, for *Meter*, read *Meteor.*

On page 111, against January 7, 1831, for *Krankfurt*, read *Frankfurt.* Against December 11, 1830, for *Newbery*, read *Newberry.*

On page 112, against May 30, 1831, for *Burney*, read *Burney*[3]; and against August 19, for *Henry*[3], read *Henry*[4].

On page 113, to the aurora of October 31, 1832, add Kupffer as authority. See *Annuaire Magnet. et Météor. de Russie*, 1845, *Suppl., p.* 5.

On page 115, note 1, the reference is to *August* 12, 1836, and not *August* 12, 1834. See *Corr. Math. et Physique*, X. 178.

On page 118, to the observation of October 18, 1836, at St. Petersburg, add the reference: *Observ. Météor. et Magnet. de Russie*, 1836, *p.* 170.

On page 119, the aurora of *September* 18, 1837, at Yakoutsk, is not mentioned in the *Annuaire Magnet. et Météor. de Russie*, 1839, *Suppl., p.* 423; but only those of *September* 3 *and* 11.

On the same page, to the aurora of February 18, 1837, at Catherinebourg, add the reference, viz., *Annuaire Magnet. et Météor. de Russie*, 1837, *p.* 28.

On page 120, against October 18, 1837, for *Zlaloouste*, read *Zlatoouste;* and add *page* 200 to the note.

On the same page, to the observation of October 6, 1837, at St. Petersburg, add the reference: *Observ. Météor. et Magnet. de Russie*, 1837, *p.* 120.

On page 123, first line, for *January* 25, 1839, read *January* 16.

On page 135, the observation at Toronto was on *July* 7, 1843, instead of *July* 4.

On page 156, against the aurora of February 10, 1850, Noodt's reference is omitted, viz., *Annales de l'Observatoire Physique Central de Russie*, 1860, *Supplément, p.* 27.

On page 164, the observations at Christiania, assigned to January 14, 27, and 28, 1853, belong to February 14, 27, and 28. In note 1, relating to Maguire, for 1823 – 4, read 1853 – 4.

On page 171, &c., besides the auroras here given for Athens, luminous appearances were seen there August 2, 7, 8, September 26, 1861, and July 21, 1862, which are described as "phosph. Bögen," or "phosph. Streifen." Wochenschrift für Astronomie, Meteorologie, etc., VII. 10.

On page 190, there are some trifling errors in the table for Paris, as will appear by examining the catalogues for the years 1787, 1788, and 1794 – 1799.

On page 219, note 5, *Report of the British Association*, for *XXVIII.* read *XXVII.*

On page 234, note 2, add the original reference to Secchi's publication *Sul le Var. Per. del Mag. Terr. Estratta dagli Atti dell' Accademia Pontificia d'Nuovi Lincei. Anno VI. Sessime* 1ª, *del* 19 *December*, 1852, *p.* 56.

On page 243, line 4, for *decimal*, read *decennial*.

Also, in note 1, to *Astronomischen Nachrichten*, add *Vol. XLVII. p.* 286.

On page 251, to the two auroras observed at Paris on October 16 and 17, add the year 1795; and for *October* 16 *and* 17, read *October* 17 *and* 18.

On page 255, to the observations at Nova Zembla in 1834 may be appended the following note: Durant tout l'automne pendant les nuits sereines ou peu nuageuses il y avait souvent des aurores. *Annuaire Magnet. et Météor. de Russie*, 1845, Supplement.

On page 258, in note 2 on right hand, to *Fortschritte der Physik*, add *für* 1847, *p.* 179.

On page 289, it may be remarked in reference to the year 1859, that auroras are mentioned as occurring on February 11, 12, 14, and 18, July 18 (*australis*), August 2 and 25, and on October 13, which are not in any of my catalogues. *Vierteljahrsschrift der Naturforsch. Gesellsch. in Zürich*, V. 239.

From 1772, when the *new style* was used in recording the St. Petersburg observations, as far as page 65, the printed dates of this catalogue are eleven days in advance of the correct dates.

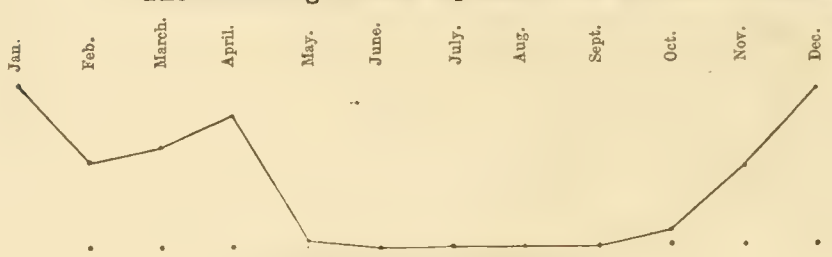
In my paper on the *Secular Periodicity* of the aurora, in Volume IX. p. 120 of these Memoirs, in the record of Dr. Hale's observations, for *June* 14 *and* 19, 1839, read *January* 14 *and* 19.

Auroras were seen in Upsal, Sweden, on February 18 and 19, September 15, October 16, November 29, 1855. *Nova Acta Regiæ Soc. Scientiarum Upsaliensis*, S. III. Vol. II. p. 257.

Auroras were seen by J. W. Lovering, on August 14, in Lat. 54° N., Long. 21° 36′ W.; near the Orkney Islands on August 18 and 19 (the latter feeble); in the Gulf of Finland, near Cronstadt, on October 11 and 12, 1866.

Note.—It should be stated that pages 25 to 200 inclusive were printed previously to January, 1866; pages 201 to 216 inclusive previously to November, 1866; pages 217 to 248 inclusive previously to May, 1867; pages 218 to 304 and pages 1 to 8 inclusive previously to September, 1868; pages 305 to 344 inclusive previously to August, 1870, and pages 345 to end previously to May, 1871.

The following curves represent the number of Auroras in the different months, beginning with January.



Fort Reliance, (1834,) 125 auroras.

Gothaab, Greenland, (1841–46,) 430 auroras.

Jacobshavn, Greenland, (1840–51,) 185 auroras.

Quebec, Canada, (1848–52,) 229 auroras

Newfoundland, (1849–51,) 151 auroras.

Newberry, Vt., (1834–61,) 218 auroras.

Burlington, Vt., (1852–53,) 74 auroras.

Toronto, Canada, (1840–67,) 1242 auroras.

The following curves represent the number of Auroras in the different months, beginning with January.

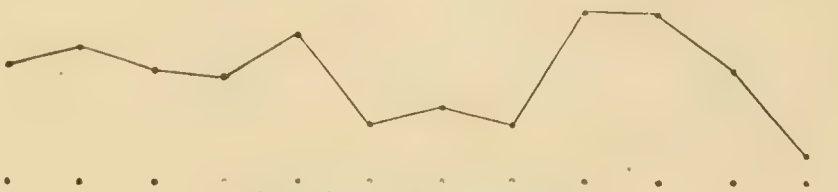
Brunswick, Maine, (1807–57,) 108 auroras.

New York State, (1826–50,) 1205 auroras.

Salem, Mass., (1786–1820,) 198 auroras.

Worcester, Mass., (1839–62,) 212 auroras.

Cambridge, Mass., (1742–1864,) 706 auroras.

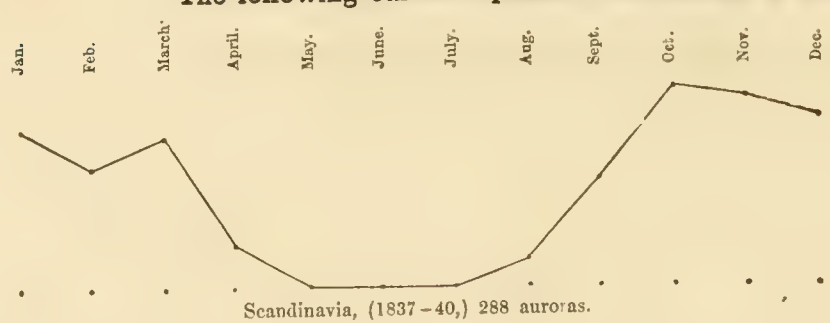


Providence, R. I., (1832–60,) 160 auroras.

New Haven, Conn., (1763–1854,) 813 auroras.

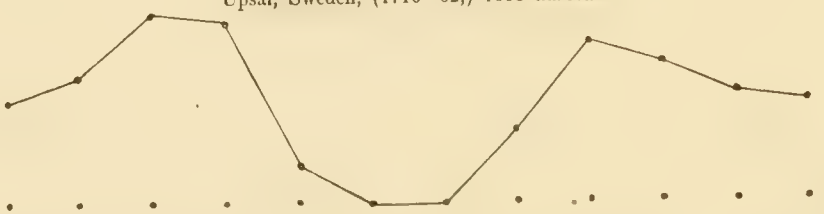
Wilmington, Del., (1827–33,) 53 auroras.

The following curves represent the number of Auroras in the different months, beginning with January.



Scandinavia, (1837–40,) 288 auroras.

Upsal, Sweden, (1716–62,) 1018 auroras.



Stockholm, Sweden, (1783–92 and 1859–66,) 404 auroras.

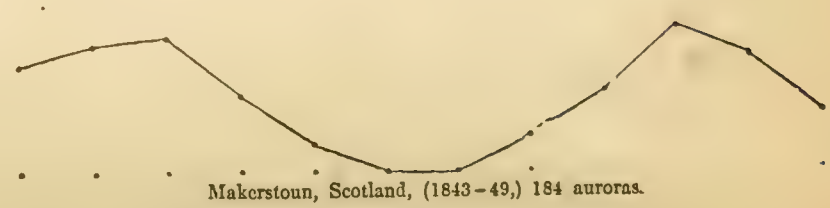
Hammerfest, Norway, (1850–61,) 91 auroras.

Christiania, Norway, (1837–66,) 936 auroras.

Abo, Finland, (1748–1843,) 682 auroras.

St. Petersburg, (1726–1861,) 1086 auroras.

Dunse, Scotland, (1838–47,) 238 auroras.

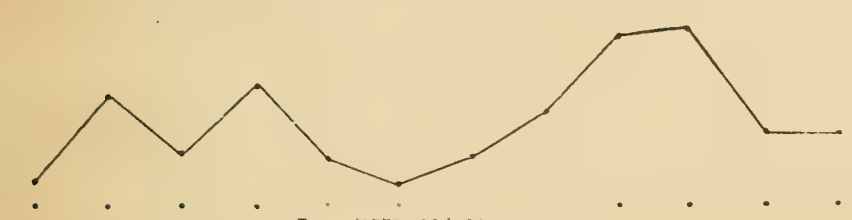


Makerstoun, Scotland, (1843–49,) 184 auroras.

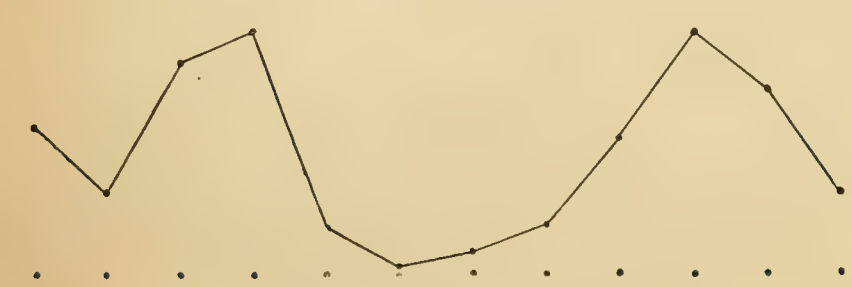
The following curves represent the number of Auroras in the different months, beginning with January.

Berlin, (1707–89,) 341 auroras.

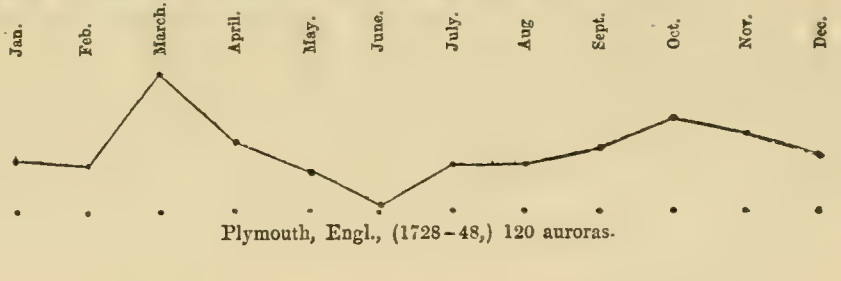
Mannheim, (1781–92,) 216 auroras.



Jena, (1770–96,) 84 auroras.



Sagan, (1781–92,) 240 auroras.

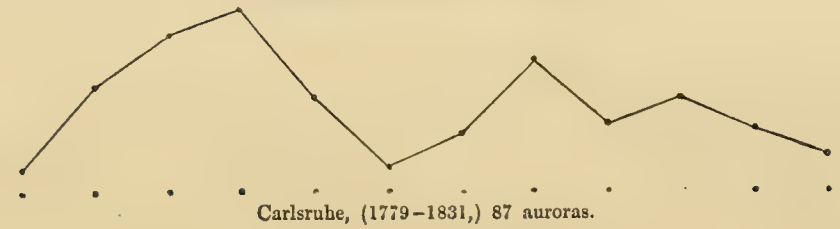


Plymouth, Engl., (1728–48,) 120 auroras.

G. Britain, (1786–1834,) 435 auroras.

Ratisbon, (1781–91,) 54 auroras

Wittemberg, (1730–51,) 91 auroras.



Carlsruhe, (1779–1831,) 87 auroras.

The following curves represent the number of Auroras in the different months, beginning with January.

Paris, France, (1710–1842,) 264 auroras.

Montmorenci, France, (1771–1805,) 175 auroras.

Italy, (1727–51,) 88 auroras.

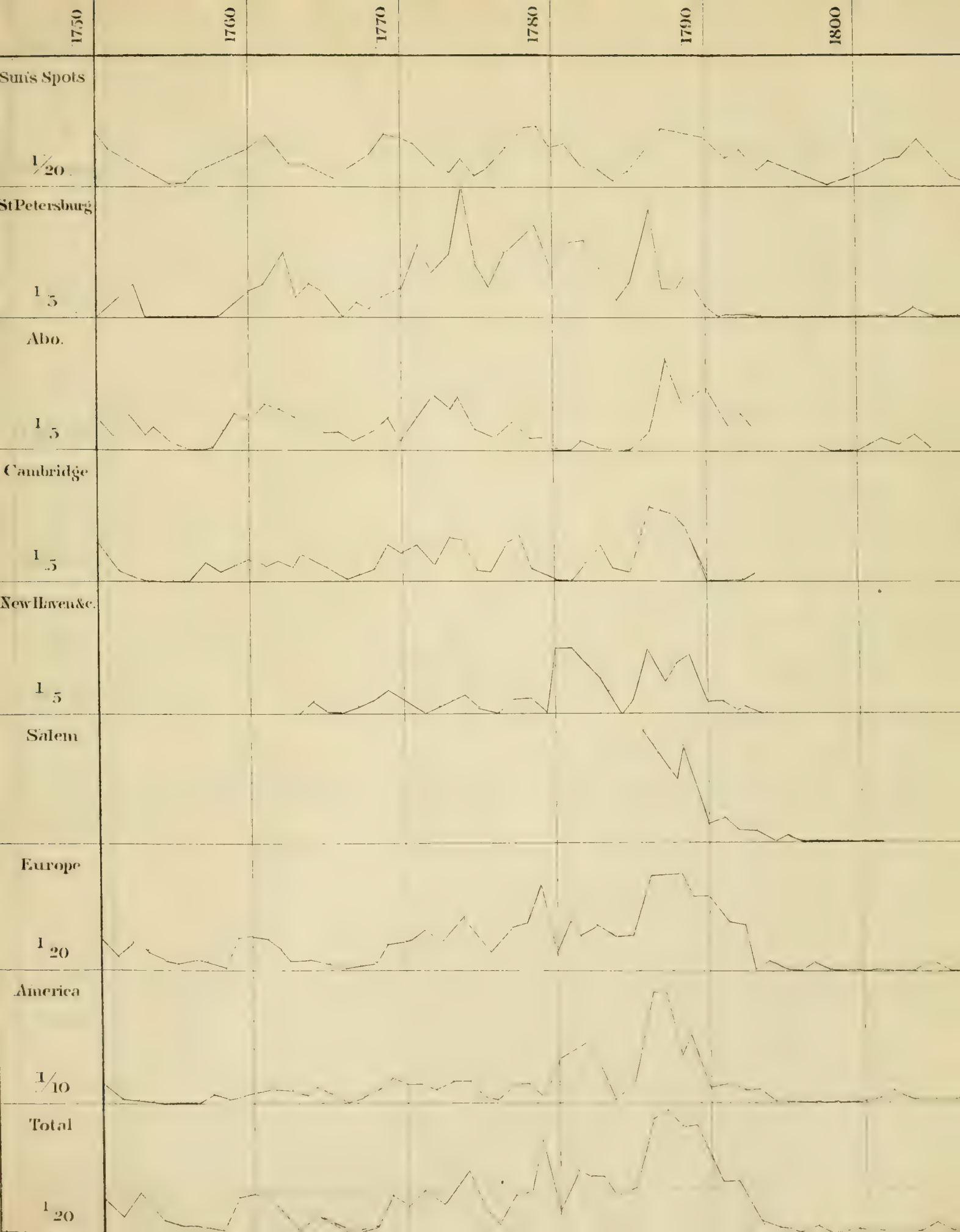
Mean Result from 11,958 auroras.

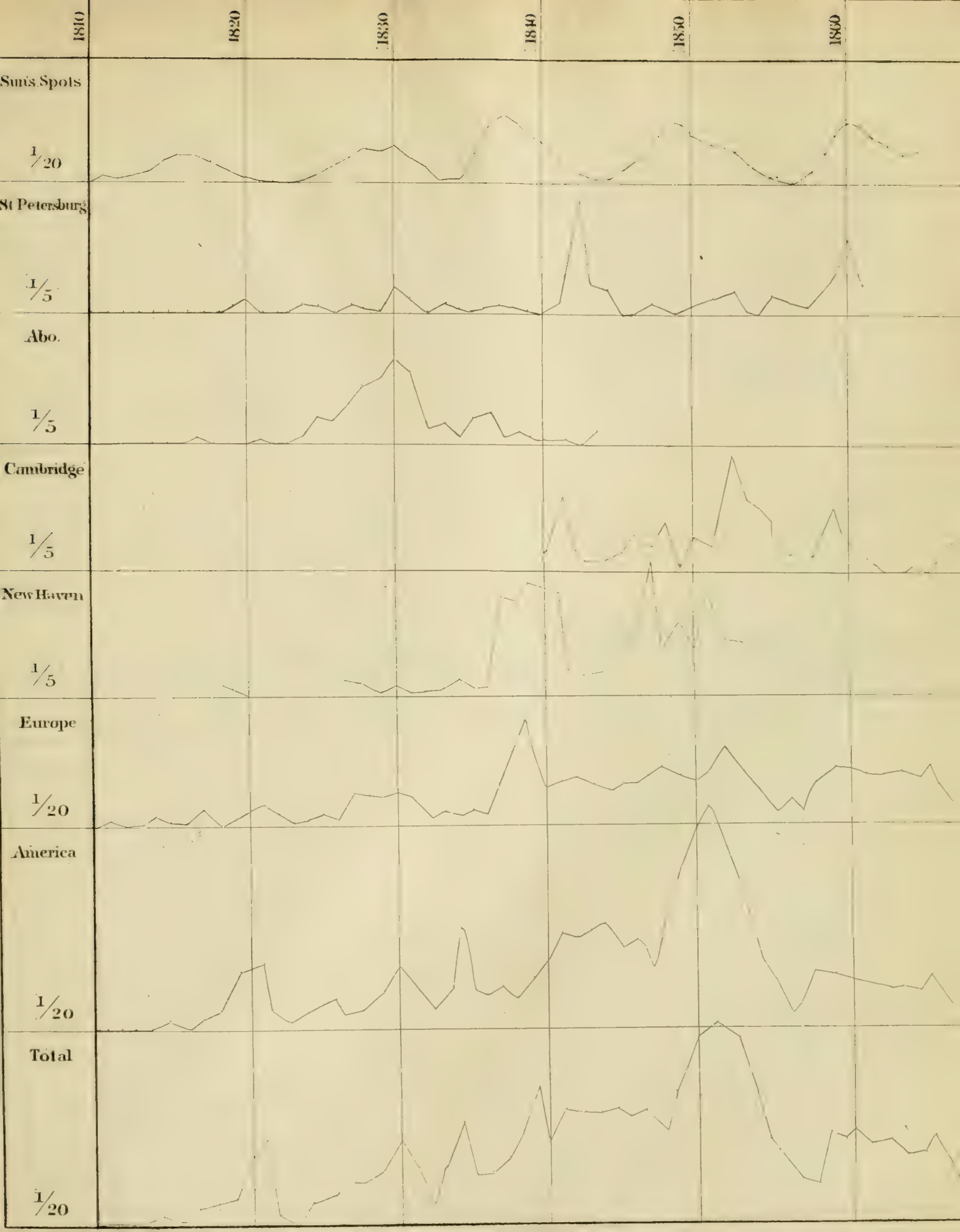
Copenhagen, (1782–88,) 48 auroras.

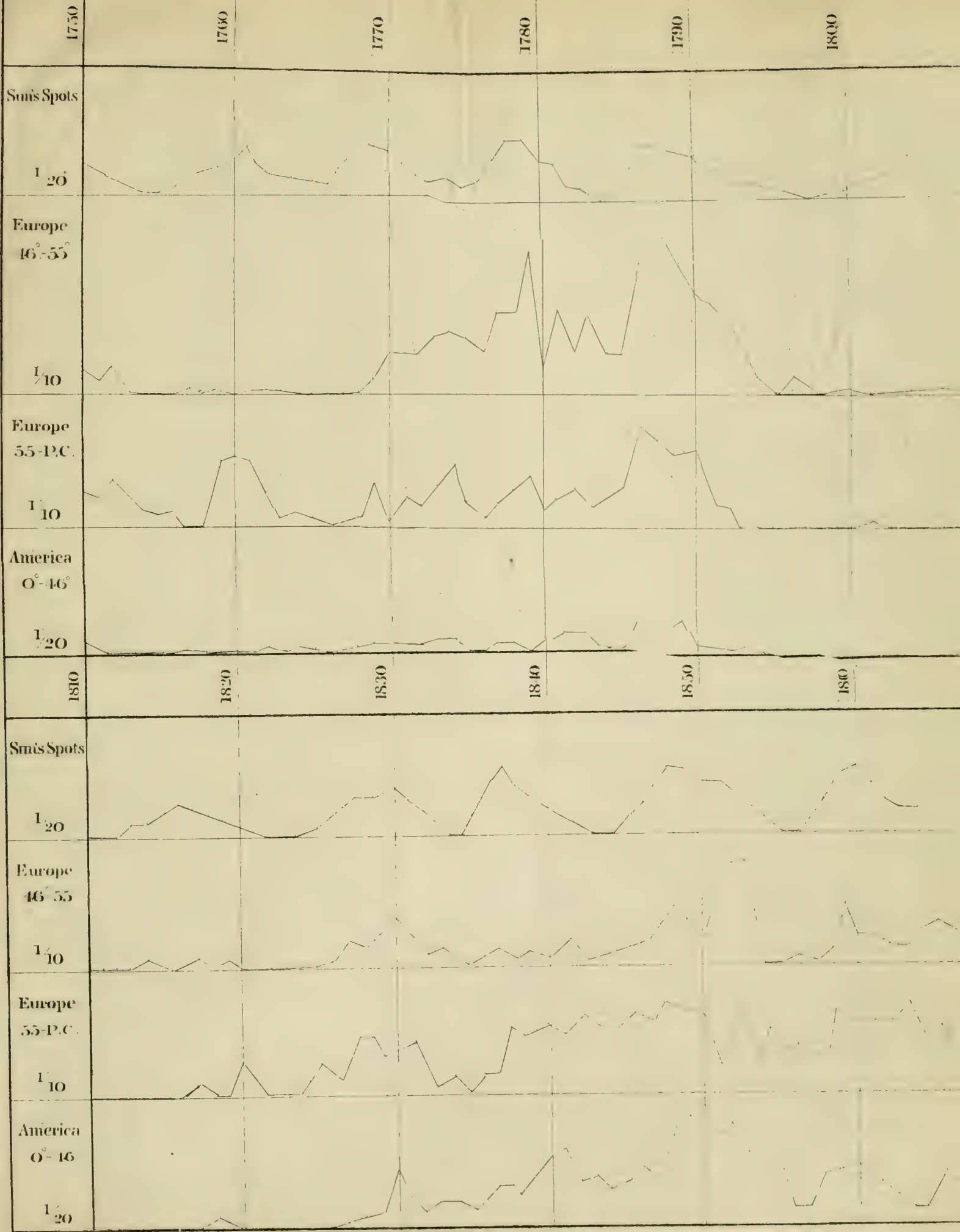
Holland, (1728–57,) 720 auroras.

Franeker, Holland, (1771–81,) 231 auroras.

Brussels, Belgium, (1778–1851,) 231 auroras.


1750
1760
1770
1780
1790
1800
Suns Spots
1/20
St Petersburg
1/5
Abo.
1/5
Cambridge
1/5
New Haven &c.
1/5
Salem
Europe
1/20
America
1/10
Total
1/20


1810
1820
1830
1840
1850
1860
Sun's Spots
1/20
St Petersburg
1/5
Abo.
1/5
Cambridge
1/5
New Haven
1/5
Europe
1/20
America
1/20
Total
1/20


1750
1760
1770
1780
1790
1800
Sun's Spots
1/20
Europe
46°-55°
1/10
Europe
55-P.C.
1/10
America
0°-46°
1/20
1810
1820
1830
1840
1850
1860
Sun's Spots
1/20
Europe
46°-55°
1/10
Europe
55-P.C.
1/10
America
0°-46°
1/20

MEMOIRS

OF THE

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OF

ARTS AND SCIENCES.

NEW SERIES.

VOL. X.—PART II.

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III.

Discovery of Palæolithic Flint Implements in Upper Egypt.

BY PROF. HENRY W. HAYNES.

Presented January 12, 1881.

Henry Brugsch, in the last edition of his "History of Egypt under the Pharaohs," which has appeared during the present year, asserts that "Egypt throws scorn upon the assumed periods of the three ages of stone, of bronze, and of iron."[1] So also the late Aug. Mariette,[2] the successful explorer of the antiquities of Egypt, and M. Chabas,[3] one of the most eminent of their interpreters, while admitting that flints bearing evident traces of human workmanship have been found in that country, alike deny that such objects must necessarily be assigned to a very remote period, claiming that stone implements were used by its inhabitants during historic times. Lepsius,[4] the most eminent living Egyptologist, even goes so far as to refuse to allow the human origin of the numerous broken flints found in that country, maintaining that they have been produced solely by natural causes. These eminent authorities have persisted in their incredulity, notwithstanding the fact that M. Arcelin,[5] so far back as February, 1869, had announced that he had discovered in the Nile Valley flint implements resembling those found in Western Europe; and later in the same year Dr. Hamy[6] and M. Lenormant, and subsequently the Abbé Richard,[7] had reported similar discoveries in the same region. Sir John Lubbock,[8] also, who had made a journey to Egypt in 1873, for the purpose of forming an independent judg-

[1] History of Egypt, chap. iii.

[2] Notice des Prin. Mon. du Musée à Boulaq, p. 81. Matériaux pour l'Hist. Prim. — et Nat. de l'Homme, Vol. IX. p. 17, and Vol. XIV. p. 43.

[3] Études sur l'Ant. Hist. d'Après les Sources Égypt., pp. 330, 337.

[4] Matériaux, Vol. IX. p. 16. Zeitschrift f. Aegypt. Sprache & Alt. 1870, pp. 89, 113.

[5] Matériaux, Vol. V. p. 136. L'Industrie Prim. en Égypte, Rapp. au Min. d'Instruction, Juin 26, 1869.

[6] Matériaux, Vol. VI. p. 27.

[7] Ibid., p. 248.

[8] Jour. of the Anthrop. Inst. of Great Britain, Vol. IV. p. 215.

ment upon the question after inspecting the localities, had been even more successful than his predecessors, and had published an account of his discoveries in that country, illustrated by several plates, one of which represents three implements that may fairly be regarded as of the palæolithic type.

There has been a good deal of discussion in several scientific bodies in regard to the legitimate conclusions to be drawn from these different discoveries, with the general result, that, owing to the comparatively limited number and extent of such finds, the existence in Egypt of the "stone age," and especially of the palæolithic age, has either been absolutely denied, or the question has been considered as a still unsettled problem. This circumstance has been much dwelt upon by the opponents of the belief in "the antiquity of man," who ask for an explanation of how it happens that the "stone age" should fail to make its appearance in the oldest country, in regard to which we possess direct historic information.[1]

In this condition of the question, I determined to take advantage of a visit to Egypt, in the winter of 1877–78, to make a thorough investigation of the subject. It was my good fortune soon to discover an atelier of worked flints in the desert a few miles east of Cairo, not far from the Red Mountain, on the road to the "Petrified Forest." Here I found a few examples of axes of the St. Acheul type, made from water-worn flint pebbles, still retaining some portion of their original surface. Flint does not occur *in situ* in this locality. From this station I also secured quite a number of scrapers, lance-heads, knives, etc.

Afterwards I made several visits to the hot sulphur springs at Helouan, in the desert, on the east bank of the Nile, about fifteen miles south of Cairo. In this place, Dr. Reil, the director of the bathing establishment here situated, had discovered, in 1872, numerous worked flints, generally of minute size and of quite peculiar types. Dr. Jukes Brown, in the winter of 1877, also discovered similar objects here, which he described and figured in a communication to the Anthropological Institute on May 18, 1878.[2] At this place I, too, was fortunate enough to find numerous specimens of the same types, which have been regarded as almost peculiar to this locality, since they had never been met with elsewhere, with the exception of a few similar ones discovered by M. Rivière in the caves of Mentone, in the south of France.

Some weeks later I went up the Nile, and as a hotel had just been opened for the first time at Luxor, the site of ancient Thebes, "of the hundred gates," I was able to remain in that locality more than six weeks. This gave me the opportunity of making

[1] Southall, The Recent Origin of Man, pp. 20, 31. The Epoch of the Mammouth, p. 4.

[2] Jour. of the Anthrop. Inst., Vol. VII. p. 396.

much more careful and extended search for prehistoric remains than had been enjoyed by any who had previously looked for them. I searched the region thoroughly on both sides of the Nile, for distances as great as it was possible to cover in journeys of one day's length. The valley here is bounded on each side by hills of tertiary limestone, filled with layers of flint, on the flanks of which the present surface soil rests without any intervening pleistocene deposits. On the western side these hills are pierced by numerous dry ravines, or wadys, through which the sands of the Libyan Desert make their way down towards the cultivable strip of alluvial soil on the bank of the river. Although Upper Egypt is a rainless region, still occasionally — perhaps once in twenty years — heavy rains occur, and great torrents tear their way down these wadys into the Nile. In the bottom of such ravines, and sometimes on the summits of the elevated plateaux of the hills, after long-continued and most laborious searching, I was rewarded by finding several specimens of palæolithic axes of the true St. Acheul type. I found, besides, innumerable examples of all the different objects that are commonly met with in other countries in which the existence of the "stone age" is regarded as established. Such were nuclei, disks, scrapers, piercers, lance-heads, arrow-points, knives, flakes, etc., together with some forms that were quite novel. All these, without exception, had been fabricated by the process of chipping. I have, indeed, seen *polished* stone implements that had been discovered in Egypt, but I have never myself found a single one there. Quite a number of objects were met with in the desert, on the east bank of the river; but the valley on this side is so much wider, that I was not able to reach the hills in one day and have sufficient time left for searching. Pleistocene deposits do not occur in the Nile Valley, so far as I am aware, although they are reported to exist in various parts of the adjacent desert of the Sahara. Quite recently, fine specimens of quartzite implements of the St. Acheul type have been placed in the Museum of St. Germain, which were brought back by M. Rabourdin, who came upon not less than eighteen sites of the manufacture of stone implements in the course of his explorations of the Sahara. But in the valley of the Nile it is only in such spots as those in which I obtained these implements that we can hope to find now any relics of the "stone age." Most traces of early man in Egypt must necessarily, at the present time, lie buried under hundreds of feet of Nile mud, the accumulation of the annual inundations of the river for countless ages.

The first notice of my discovery was contained in a note to the article, already referred to, by Dr. Jukes Brown in the "Journal of the Anthropological Institute" for May, 1878. His information was obtained from a gentleman who had seen my

collection at Luxor. The objects themselves I brought to Paris, and at the request of M. de Mortillet, who had charge of the anthropological department of the great French Exposition of that year, I placed a selection from them on exhibition there, for which a medal and a diploma were awarded to me.[1] I also presented some of them at the meeting of the Société d'Anthropologie de Paris, held on October 10, 1878, at which time I gave a brief statement of the circumstances under which they were found.[2] M. de Mortillet has since spoken of my discovery in an article in the "Revue d'Anthropologie,"[3] copied into the "Matériaux,"[4] and translated for the "Popular Science Monthly" for April, 1879. I have myself also referred to it in an article upon "The Fossil Man," in the "Popular Science Monthly" of last July, but hitherto I have not published any designs of the objects.

The late Dr. F. Mook, whom I guided to a locality where he found certain implements, has recently published a work, illustrated by several plates, in which he makes the statement that I "have no objects differing from those figured by him;"[5] but it will be seen upon comparison that this is not the case.

May not the discovery of this large quantity of flint implements, including several of the most ancient type known, of which some threescore select specimens are here delineated, be fairly claimed to have settled the vexed question of the existence of the "stone age" in Egypt?

[1] Catalogue Spéc. des Sciences Anthrop., p. 80.

[2] Bulletin de la Soc. d'Anthrop., Trois. Sér., T. III., Juill. 1878, p. 339.

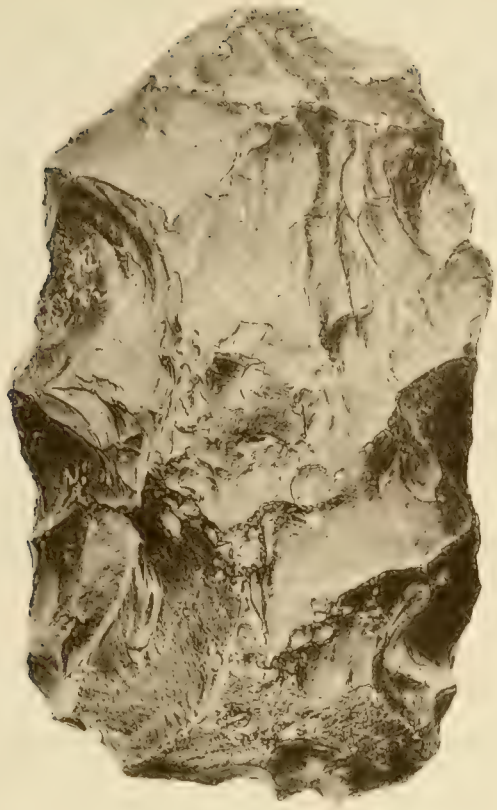
[3] Sec. Sér., Vol. II., Jan. 1879, p. 115.

[4] Vol. XIV. p. 44.

[5] Aegyptens Vormetallische Zeit von F. Mook, Würzburg, 1880, p. 27.

PLATE 1.

PLATE 2.



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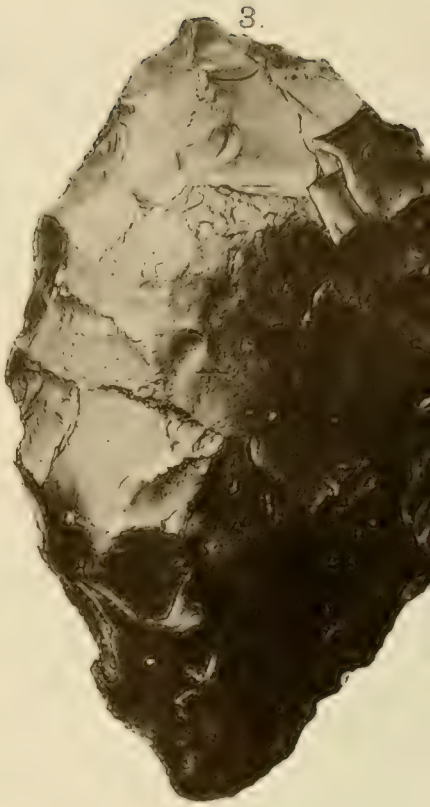

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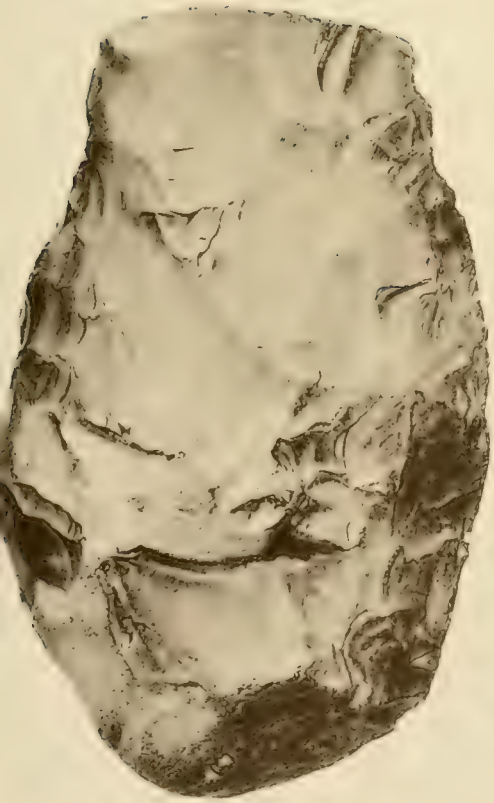

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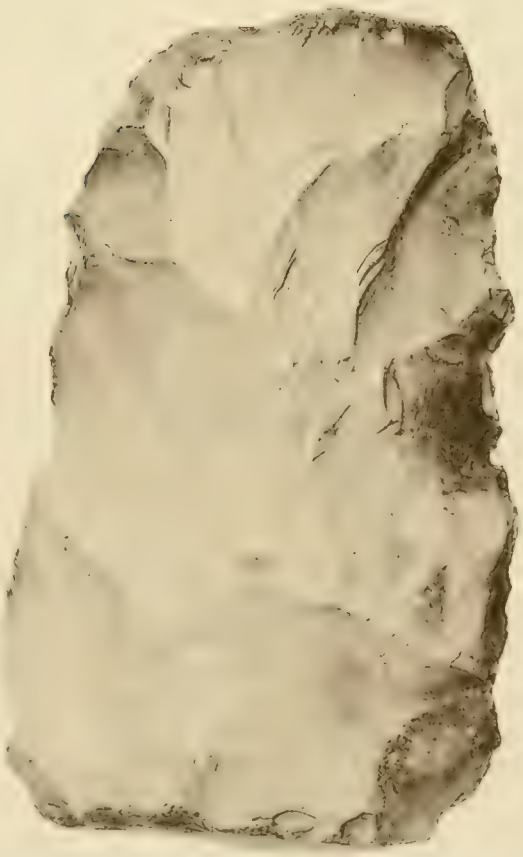

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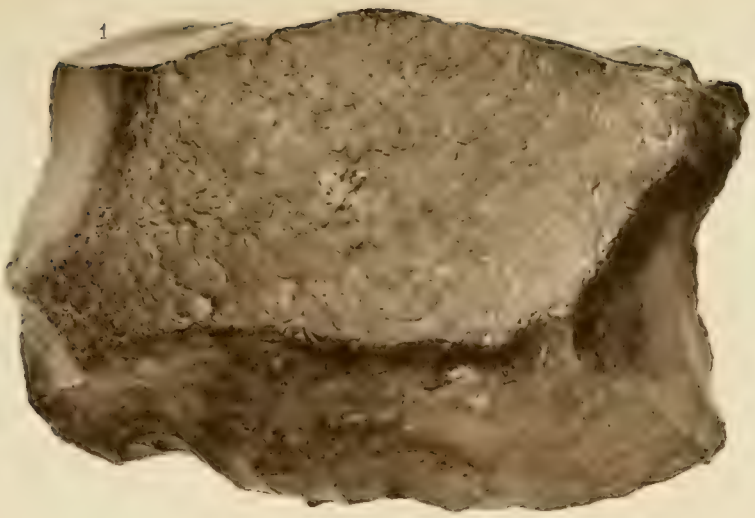
PLATE 3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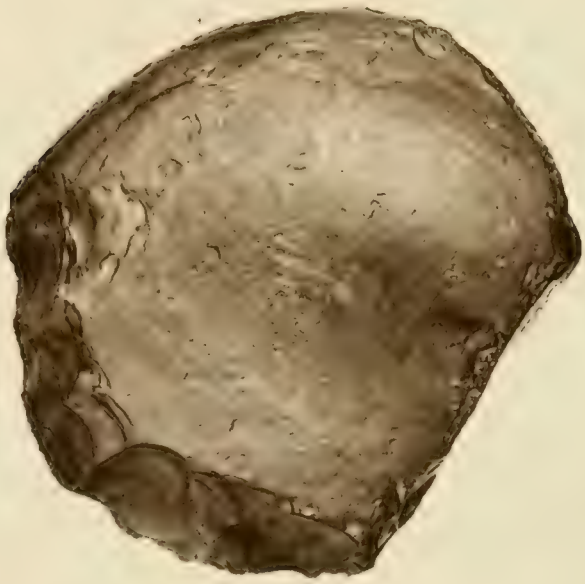

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PLATE 4.

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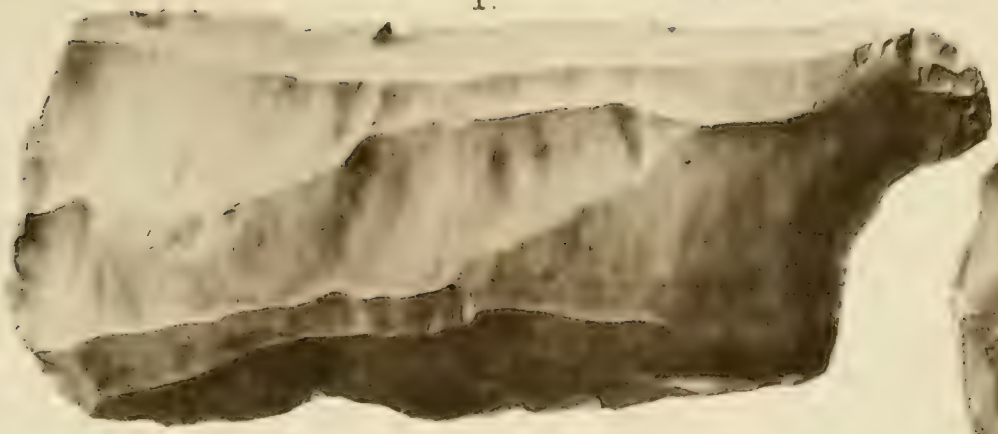

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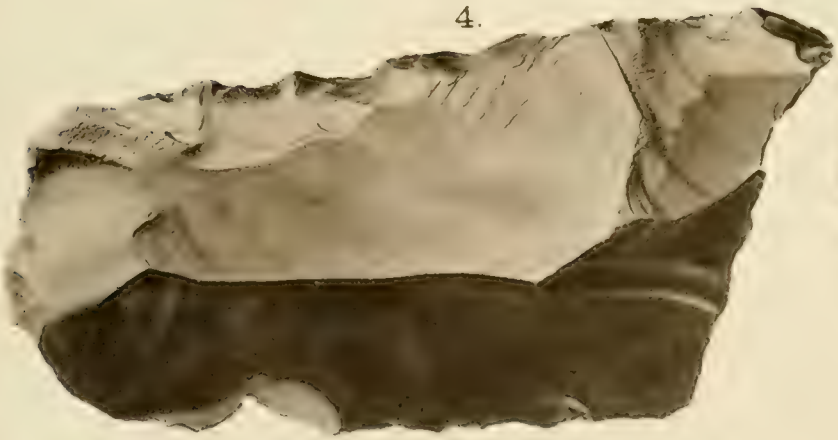

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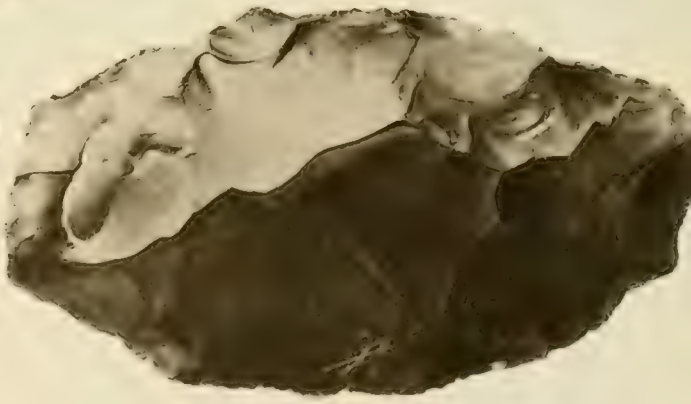

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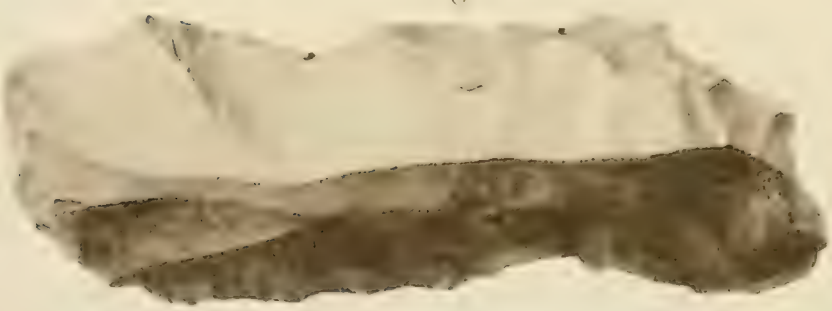

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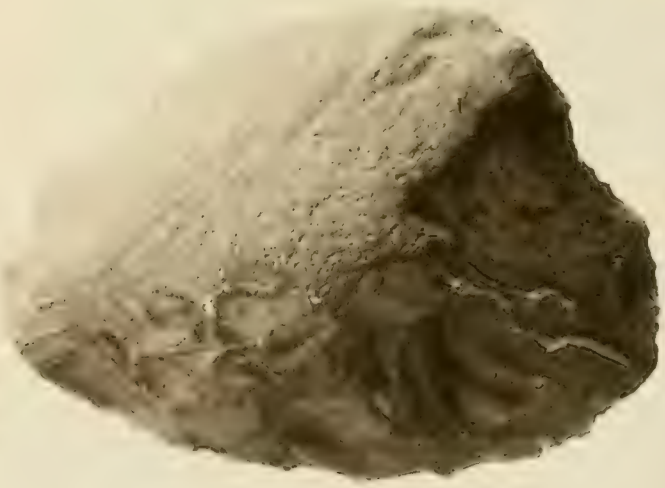

PLATE 5

PLATE 6

PLATE 7

DESCRIPTION OF THE PLATES.

All the objects are represented of their natural size.

PLATE I.

Fig. 1. Axe, type of St. Acheul. Luxor. Desert on the left bank of the Nile.
Fig. 2. Same (broken). Same locality.
Fig. 3. Same. Showing at the top the natural surface of the pebble from which it was made. Vicinity of the "Red Mountain," near Cairo.
Fig. 4. Disk. Luxor. Left bank.
Fig. 5. Same. Showing the natural surface of the pebble from which it was made. Same locality.

PLATE II.

Fig. 1. Axe, type of St. Acheul. Luxor. Desert on the left bank of the Nile.
Fig. 2. Same. Same locality.
Fig. 3. Same. Luxor. From the plateau overlooking the "Tombs of the Kings."
Fig. 4. Same. Luxor. Left bank.
Fig. 5. Same. Same locality.
Fig. 6. Same. Showing at the top the natural surface of the pebble from which it was made. Same locality.

PLATE III.

Fig. 1. Rectangular Chopper, novel type. Luxor. Desert on the left bank of the Nile.
Fig. 2. Triangular axe, type of St. Acheul. Same locality.
Fig. 3. Axe, type of St. Acheul. Same locality.
Fig. 4. Hatchet, very rude, merely chipped pebble. Vicinity of the "Red Mountain," near Cairo.
Fig. 5. Same. Same locality.
Fig. 6. Axe, type of St. Acheul. Luxor. Left bank.
Fig. 7. Oval axe, type of St. Acheul. Same locality.

PLATE IV.

Fig. 1. Knife, resembling specimens in the museums of Turin, Leyden, and the Historical Society of New York. Supposed to have been used in embalming. Luxor. Desert on the left bank of the Nile.
Fig. 2. Lance-head, type of Le Moustier. Luxor. Tombs of the Kings.
Fig. 3. Knife. Luxor. Left bank.
Fig. 4. Same. Same locality.
Fig. 5. Axe, type of St. Acheul. Same locality.
Fig. 6. Knife. Same locality.
Fig. 7. Chopper, type of Le Moustier. Luxor. Vicinity of the Temple of Medinet Aboo.

PLATE V.

Fig. 1. Rectangular hatchet, novel type. Luxor. Desert on the left bank of the Nile.
Fig. 2. Hatchet, with cutting edge produced by a series of lateral blows, novel type. Same locality.
Fig. 3. Axe, type of St. Acheul. Same locality.
Fig. 4. Oval axe, type of St. Acheul. Same locality.
Fig. 5. Same. Same locality.
Fig. 6. Novel object, use unknown. Same locality.
Fig. 7. Lance-head (beautifully worked). Same locality.
Fig. 8. Lance-head, different shape. Same locality.
Fig. 9. Shoe-shaped scraper. Same locality.
Fig. 10. Small hatchet, edge produced in same manner as in Fig. 2. Luxor. Vicinity of the Rameseum.
Fig. 11. Hatchet or knife. Luxor. Left bank.
Fig. 12. Same. Same locality.

PLATE VI.

Fig. 1. Chopper, type of Le Moustier. Luxor. Desert on the left bank of the Nile.
Fig. 2. Scraper. Same locality.
Fig. 3. Same. Same locality.
Fig. 4. Lance-head, type of Le Moustier. Same locality.
Fig. 5. Hatchet (the broken edge-portion). Vicinity of the "Red Mountain," near Cairo.
Fig. 6. Scraper (?). Novel type. Luxor. Left bank.
Fig. 7. Hatchet. Same locality.
Fig. 8. Chopper, type of Le Moustier. Same locality.
Fig. 9. Triangular hatchet. Same locality.
Fig. 10. Nucleus. Same locality.
Fig. 11. Same. Vicinity of the "Red Mountain," near Cairo.

PLATE VII.

Fig. 1. Arrow-head. Luxor. Desert on the right bank of the Nile.
Fig. 2. Same (broken). Same locality.
Fig. 3. Same. Same locality.
Fig. 4. Same. Same locality.
Fig. 5. Flake, with hollow probably produced by rounding arrow-shafts. Same locality.
Fig. 6. Scraper. Luxor. Left bank.
Fig. 7. Same. Vicinity of the "Red Mountain," near Cairo.
Fig. 8. Same. Luxor. Left bank.
Fig. 9. Hatchet. Same locality.
Fig. 10. Same. Helouan.
Fig. 11. Nucleus. Same locality.
Fig. 12. Same. Same locality.
Fig. 13. Same. Luxor. Left bank.

IV.

General Properties of certain Partial Differential Equations similar to those of Hydrodynamics.

BY THOMAS CRAIG, PH. D.

U. S. Coast and Geodetic Survey, and Johns Hopkins University.

Presented January 12, 1881.

THE following investigation was suggested by certain results which I obtained in a previous paper entitled "General Properties of the Equations of Steady Motion" which has been published by the United States Coast Survey. It was my intention in that paper to study steady motion only, but as I went on with the work, I perceived that many of the results were applicable to fluid motion in general, and that the whole subject admitted of a generalization which would present a number of interesting points.

In Vol. LIV. of "Crelle's Journal" there is a paper by Clebsch entitled "*Über eine allgemeine Transformation der hydrodynamischen Gleichungen*," from which I have taken the proofs of two properties of a certain determinant; the proofs are also to be found in Baltzer's treatise and in Scott's treatise on determinants. I did not see Clebsch's paper until I had nearly completed mine, or I could have omitted one or two tedious processes that I have given by merely referring to Clebsch's article for the required demonstrations. It will perhaps be better, however, to leave this paper as it is, both because it is simpler and because the two papers are so unlike in their aims and methods of development, that, in order to merely refer to the article by Clebsch, it would be necessary for me to change my article throughout. Clebsch has in view merely a general transformation of the equations of hydrodynamics, while I have in view a general investigation of the "higher orders of motion" (vide Note at end) and of the properties of a certain set of Partial Differential Equations of the first order.

The present paper is divided into two parts, of which Part I. is herewith communicated to the Academy; Part II. is not yet completed. In Part II. it is my

intention to generalize somewhat the methods and results of Part I. to make an application to the general theory of steady motion (n variables), and finally to apply all of the results of both parts to space of three dimensions, i. e. to the ordinary theory of hydrodynamics.

(Just here I wish to call attention to the Note at the end of this paper; it properly belongs in Part II., but as I wish it made public at the earliest opportunity, I have inserted it in Part I.)

In Part I. an account is given of a set of partial differential equations similar to those of hydrodynamics, but containing $n + 1$ independent variables, or, if we may use the expression, the equations of fluid motion for space of n dimensions.

Denote by $x_1, x_2, x_3, \ldots . x_n, t$ the independent variables of the problem; by $u_1, u_2, \ldots . u_n, U$, certain functions of these variables. For a problem in hydrodynamics the function U is given by

$$U = V + \int \frac{dp}{\rho}, \tag{1}$$

V being the potential of external forces. The functions u are similar to the velocities in such an ordinary problem. Write

$$2q = u_1^2 + u_2^2 + \ldots . + u_n^2, \tag{2}$$

then

$$\frac{dq}{dx_i} = u_1 \frac{du_1}{dx_i} + u_2 \frac{du_2}{dx_i} + \ldots . + u_n \frac{du_n}{dx_i}. \tag{3}$$

Assume further

$$\xi_{12} = \frac{du_1}{dx_2} - \frac{du_2}{dx_1}, \qquad \xi_{13} = \frac{du_1}{dx_3} - \frac{du_3}{dx_1}, \text{ etc.,}$$

and generally

$$\xi_{jk} = \frac{du_j}{dx_k} - \frac{du_k}{dx_j}. \tag{4}$$

There will be of course

$$\frac{n(n-1)}{2}$$

of these quantities. The functions u are supposed to be connected by the relation

$$\frac{du_1}{dx_1} + \frac{du_2}{dx_2} + \ldots . + \frac{du_n}{dx_n} = 0. \tag{5}$$

Denoting now the operator

$$\frac{d^2}{dx_1^2} + \frac{d^2}{dx_2^2} + \ldots . + \frac{d^2}{dx_n^2}$$

by ∇, we have, on observing that $\xi_{jk} = -\xi_{kj}$,

$$\begin{aligned}
&\frac{d\xi_{12}}{dx_2} + \frac{d\xi_{13}}{dx_3} + \ldots + \frac{d\xi_{1n}}{dx_n} = \nabla u_1, \\
&\frac{d\xi_{21}}{dx_1} + \frac{d\xi_{23}}{dx_3} + \ldots + \frac{d\xi_{2n}}{dx_n} = \nabla u_2, \qquad (6) \\
&\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \\
&\frac{d\xi_{n1}}{dx_1} + \frac{d\xi_{n2}}{dx_2} + \ldots + \frac{d\xi_{n,n-1}}{dx_{n-1}} = \nabla u_n.
\end{aligned}$$

Between the three quantities ξ_{lm}, ξ_{mn}, ξ_{nl} there exists for all values of l, m, n the relation

$$\frac{d\xi_{mn}}{dx_l} + \frac{d\xi_{nl}}{dx_m} + \frac{d\xi_{lm}}{dx_n} = 0. \qquad (7)$$

This relation holds throughout the three-dimensional space determined by the directions x_l, x_m, x_n; and as these are perfectly arbitrary, it is clear that a like relation holds in each of the Euclidean spaces determined by the directions x taken in groups of three. There does not appear to be any simple expression of this form connecting all of the ξ-functions.

Consider for a moment the differential expression

$$u_1 dx_1 + u_2 dx_2 + \ldots + u_n dx_n; \qquad (\alpha)$$

the conditions that this shall be an exact differential are $\xi_{12} = \xi_{13} = \ldots = \xi_{n,n-1} = 0$; or, as these may all be written,

$$\begin{vmatrix} \frac{d}{dx_1}, & \frac{d}{dx_2}, & \ldots & \frac{d}{dx_n} \\ u_1, & u_2, & \ldots & u_n \end{vmatrix} = 0. \qquad (8)$$

If this quantity is an exact differential, say $d\phi$, the function ϕ must by virtue of (5) satisfy the differential equation

$$\nabla\phi = 0.$$

If (α) can be made an exact differential by choosing a proper integrating factor, we must have

$$u_i\xi_{jk} + u_j\xi_{ki} + u_k\xi_{ij} = 0 \qquad (9)$$

for all values of i, j, k; or, as these may be written,

$$\begin{vmatrix} u_1, & u_2, & \ldots & u_n \\ \frac{d}{dx_1}, & \frac{d}{dx_2}, & \ldots & \frac{d}{dx_n} \\ u_1, & u_2, & \ldots & u_n \end{vmatrix} = 0. \qquad (10)$$

In a paper by Professor H. W. Lloyd Tanner "On the Transformation of a Linear Differential Expression," contained in the Quarterly Journal of Mathematics for December, 1878, it is proved that

$$u_1dx_1 + u_2dx_2 + \ldots + u_ndx_n$$

is reducible to the form

$$dv_1 + w_2dv_2 + w_3dv_3 + \ldots + w_rdv_r, \qquad (\beta)$$

if, and only if,

$$\begin{vmatrix} \frac{d}{dx_1}, & \frac{d}{dx_2}, & \ldots & \frac{d}{dx_n} \\ u_1, & u_2, & \ldots & u_n \\ \cdot & \cdot & \cdot & \cdot \\ \frac{d}{dx_1}, & \frac{d}{dx_2}, & \ldots & \frac{d}{dx_n} \\ u_1, & u_2, & \ldots & u_n \end{vmatrix} = 0, \qquad (11)$$

where there are $2r$ rows; and that the same quantity is reducible to the form

$$w_1dv_1 + w_2dv_2 + \ldots + w_rdv_r,$$

if, and only if,

$$\begin{vmatrix} u_1, & u_2, & \ldots & u_n \\ \frac{d}{dx_1}, & \frac{d}{dx_2}, & \ldots & \frac{d}{dx_n} \\ \cdot & \cdot & \cdot & \cdot \\ \frac{d}{dx_1}, & \frac{d}{dx_2}, & \ldots & \frac{d}{dx_n} \\ u_1, & u_2, & \ldots & u_n \end{vmatrix} = 0, \qquad (12)$$

where there are $2r + 1$ rows. In both of these cases the functions w and v, though functions of $x_1, x_2, \ldots x_n$, are not mutually dependent. In the case in hand it will be shown that the expression (α) can always be reduced to the form (β) when $r = n + 1$. The case when $u_1dx_1 + u_2dx_2 + \ldots + u_ndx_2$ is an exact differential $d\phi$ gives for ϕ, as already remarked,

$$\frac{d^2\phi}{dx_1^2} + \frac{d^2\phi}{dx_2^2} + \ldots + \frac{d^2\phi}{dx_n^2} = 0. \qquad (13)$$

I will give here, for convenience of reference, the transformation of this equation in polar coördinates. Some of the properties of the function ϕ will be found in another part of the paper. Denote by $r, a_1, a_2, \ldots a_{n-1}$ the polar coördinates of a point in space of n dimensions. Then write

$$
\begin{aligned}
x_1 &= r\cos\alpha_1,\\
x_2 &= r\sin\alpha_1\cos\alpha_2,\\
x_3 &= r\sin\alpha_1\sin\alpha_2\cos\alpha_3,\\
&\cdots\cdots\cdots\cdots\\
x_i &= r\sin\alpha_1\sin\alpha_2\ldots\sin\alpha_{i-1}\cos\alpha_i\\
&\cdots\cdots\cdots\cdots\\
x_n &= r\sin\alpha_1\sin\alpha_2\ldots\sin\alpha_{n-1}.
\end{aligned}
\tag{14}
$$

From these we have

$$
\begin{aligned}
r &= (x_1^2 + x_2^2 + \ldots + x_n^2)^{\frac{1}{2}},\\
\cos\alpha_1 &= \frac{x_1}{r}, & \sin\alpha_1 &= \frac{\sqrt{r^2 - x_1^2}}{r},\\
\cos\alpha_2 &= \frac{x_2}{\sqrt{r^2 - x_1^2}}, & \sin\alpha_2 &= \frac{\sqrt{r^2 - (x_1^2 + x_2^2)}}{\sqrt{r^2 - x_1^2}},\\
\cos\alpha_3 &= \frac{x_3}{\sqrt{r^2 - (x_1^2 + x_2^2)}}, & \sin\alpha_3 &= \frac{\sqrt{r^2 - (x_1^2 + x_2^2 + x_3^2)}}{\sqrt{r^2 - (x_1^2 + x_2^2)}},\\
&\cdots\cdots\cdots & &\cdots\cdots\cdots\\
\cos\alpha_i &= \frac{x_i}{\sqrt{r^2 - \sum_{k=1}^{k=i-1} x_k^2}}, & \sin\alpha_i &= \frac{\sqrt{r^2 - \sum_{k=1}^{k=i} x_k^2}}{\sqrt{r^2 - \sum_{k=1}^{k=i-1} x_k^2}},\\
&\cdots\cdots\cdots\\
\tan\alpha_{n-1} &= \frac{x_n}{x_{n-1}}, & &\cdots\cdots\cdots
\end{aligned}
\tag{15}
$$

Now we have at once (writing for the moment $\alpha_0 = r$)

$$
\begin{aligned}
\nabla^2\phi = {} & \frac{d^2\phi}{d\alpha_0^2}\sum\left(\frac{d\alpha_0}{dx_k}\right)^2 + \frac{d^2\phi}{d\alpha_1^2}\sum\left(\frac{d\alpha_1}{dx_k}\right)^2 + \ldots + 2\frac{d^2\phi}{d\alpha_0 d\alpha_1}\sum\frac{d\alpha_0}{dx_k}\frac{d\alpha_1}{dx_k} + 2\frac{d^2\phi}{d\alpha_0 d\alpha_2}\sum\frac{d\alpha_0}{dx_k}\frac{d\alpha_2}{dx_k} + \ldots.\\
& + \frac{d\phi}{d\alpha_0}\nabla^2\alpha_0 + \frac{d\phi}{d\alpha_1}\nabla^2\alpha_1 + \frac{d\phi}{d\alpha_2}\nabla^2\alpha_2 + \ldots.
\end{aligned}
\tag{16}
$$

The summations in this formula are for all values of k from 1 to i. By performing the necessary operations we find quite readily

$$
\sum\left(\frac{d\alpha_0}{dx_k}\right)^2 = 1, \qquad \sum\left(\frac{d\alpha_1}{dx_k}\right)^2 = \frac{1}{\alpha_0^2}, \qquad \sum\left(\frac{d\alpha_2}{dx_k}\right)^2 = \frac{1}{\alpha_0^2\sin^2\alpha_1},
$$

$$
\sum_k\left(\frac{d\alpha_i}{dx_k}\right)^2 = \frac{1}{\alpha_0^2\Pi\sin^2\alpha_j}, \qquad j = 1, 2, \ldots. i-1,
$$

$$\sum_k \frac{d\alpha_i}{dx_k}\frac{d\alpha_{i+1}}{dx_k} = 0, \qquad i = 0, 1, 2, \ldots . n-1,$$

$$\nabla^2\alpha_0 = \frac{n-1}{\alpha_0}, \qquad \nabla^2\alpha_1 = \frac{(n-2)\cos\alpha_1}{\alpha_0^2 \sin\alpha_1}, \qquad \nabla^2\alpha_2 = \frac{(n-3)\cos\alpha_2}{\alpha_0^2 \sin\alpha_2 \sin^2\alpha_1},$$

$$\nabla^2\alpha_j = \frac{[n-(i+1)]\cos\alpha_i}{\sin\alpha_i \prod_{j=1}^{j=i-1} \sin^2\alpha_j}, \qquad \nabla^2\alpha_{n-1} = 0.$$

Substituting in $\nabla^2\phi$, replacing α_0 by r, and multiplying through by r^2 we have

$$\Delta^2\phi = r^2\frac{d^2\phi}{dr^2} + \frac{d^2\phi}{d\alpha_1^2} + \frac{1}{\sin^2\alpha_1}\frac{d^2\phi}{d\alpha_2^2} + \ldots . + \frac{1}{\prod_{j=1}^{j=i-1}\sin^2\alpha_j}\frac{d^2\phi}{d\alpha_i^2} + \ldots . + \frac{1}{\prod_{j=1}^{j=n-2}\sin^2\alpha_j}\frac{d^2\phi}{d\alpha_{n-1}^2}$$
$$+ r\frac{d\phi}{dr}(n-1) + \frac{d\phi}{d\alpha_1}\frac{(n-2)\cos\alpha_1}{\sin\alpha_1} + \frac{d\phi}{d\alpha_2}\frac{(n-3)\cos\alpha_2}{\sin\alpha_2\sin^2\alpha_1} + \ldots . + \frac{d\phi}{d\alpha_i}\frac{[n-(i+1)]\cos\alpha_i}{\sin\alpha_i \prod_{j=1}^{j=i-1}\sin^2\alpha_j}$$
$$+ \ldots . \qquad (16)$$

or, arranging a little differently,

$$\left[r\frac{d^2(r\phi)}{dr^2} + \frac{1}{\sin\alpha_1}\frac{d}{d\alpha_1}\left(\sin\alpha_1\frac{d\phi}{d\alpha_1}\right) + \frac{1}{\sin\alpha_2 . \sin^2\alpha_1}\frac{d}{d\alpha_2}\left(\sin\alpha_2\frac{d\phi}{d\alpha_2}\right) + \ldots .\right.$$
$$\left. + \frac{1}{\sin\alpha_i \prod_{j=1}^{j=i-1}\sin^2\alpha_j}\frac{d}{d\alpha_i}\left(\sin\alpha_i\frac{d\phi}{d\alpha_i}\right) + \ldots . + \frac{1}{\prod_{j=1}^{j=n-2}\sin^2\alpha_j}\frac{d^2\phi}{d\alpha_{n-1}}\right]$$
$$+ \left[(n-3)\, r\frac{d\phi}{dr} + (n-3)\frac{\cos\alpha_1}{\sin\alpha_1}\frac{d\phi}{d\alpha_1} + (n-4)\frac{\cos\alpha_2}{\sin\alpha_2}\cdot\frac{1}{\sin^2\alpha_1}\frac{d\phi}{d\alpha_2} + \ldots .\right.$$
$$\left. + [n-(i+2)]\frac{\cos\alpha_i}{\sin\alpha_i}\cdot\frac{1}{\prod_{j=1}^{j=i-1}\sin^2\alpha_j}\frac{d\phi}{d\alpha_i} + \ldots + \frac{\cos\alpha_{n-2}}{\sin\alpha_{n-2}}\cdot\frac{1}{\prod_{j=1}^{j=n-2}\sin^2\alpha_j}\cdot\frac{d\phi}{d\alpha_{n-2}}\right] = 0. \qquad (17)$$

Denote by T the region of all values of $x_1, x_2 \ldots . x_n$ for which

$$x_1^2 + x_2^2 + \ldots . + x_n^2 = R^2 \qquad (18)$$

i. e. R is the superior limit of r. Denote by S the boundary of T; then S signifies the totality of all systems of values for which

$$x_1^2 + x_2^2 + \ldots . + x_n^2 = R_2. \qquad (19)$$

The equation $\nabla^2\phi = 0$ holds throughout the entire region T and right up to the boundary S. Then it can be proved just as in the case of three variables that there is one and only one real function ϕ of the variables x, that for the whole region T is single valued and continuous, and at the boundary S coincides with an arbitrary function spread out continuously over S. The first and second differential coefficients

of ϕ will be continuous, and the latter will satisfy the equation $\nabla^2\phi = 0$. Denote by dT the element of the region T; then

$$dT = dx_1 dx_2 dx_3 \ldots . dx_n = r^{n-1} \left(\prod_{k=1}^{k=n-2} \sin^{n-k-1} \alpha_k \, d\alpha_k \right) d\phi^{n-1} dr. \tag{20}$$

The element of the boundary S is dS, and this is readily found to be given by

$$dS = R^{n-1} \left(\prod_{k=1}^{k=n-2} \sin^{n-k-1} \alpha'_k \, d\alpha'_k \right) d\alpha'_{n-1} \tag{21}$$

(R, α'_1, α'_2, ... α'_{n-1} being the limits of r, α_1, α_2, ... α_{n-1})

Introducing now an angle δ defined by

$$\cos\delta = \cos\alpha_1 \cos\alpha'_1 + \sum_{k=1}^{k=n-1} \{\cos\alpha_{k+1} \cos\alpha'_{k+1} \prod_{j=1}^{j=k} \sin\alpha_j \sin\alpha'_j\} + \prod_{k=1}^{k=n-1} \sin\alpha_k \sin\alpha'_k \tag{22}$$

The introduction of this angle δ enables us to obtain quite easily

$$\phi = \frac{\Gamma\left(\frac{n}{2}\right)}{2\pi^{\frac{n}{2}}} \int_1 \int_2 \cdots \int_{n-1} \frac{\phi_1 (R^2 - r^2)\, dS}{R\,(R^2 + r^2 - 2Rr\cos\delta)^{\frac{n}{2}}} \tag{23}$$

ϕ_1 denoting the arbitrarily chosen surface value of ϕ.

Further consideration of this function ϕ will be deferred for the present, as a full investigation of its properties would require the development of the theory of spherical harmonics for a space of n dimensions. Equation (17) will afford the means of obtaining some of the more elementary of these properties.

We will resume here the consideration of the quantities ξ_{jk}. Observe that if we denote the quantities of the left-hand sides of equations (6) by a single letter, say by $\eta_1, \eta_2, \ldots .$ that we have identically

$$\frac{d\eta_1}{dx_1} + \frac{d\eta_2}{dx_2} + \ldots . + \frac{d\eta_i}{dx_i} = 0. \tag{24}$$

If now from the η's we form quantities similar to the ξ's and call them $\xi^{(1)}_{12}$, $\xi^{(1)}_{13}$ . . . . we shall have a set of equations of the same form as (6) with ξ replaced by $\xi^{(1)}$ and u replaced by η. Calling the left-hand members of this new set $\eta^{(1)}_1$, $\eta^{(1)}_2$, ..., and again performing the same operations, we get equations similar to (6) with the ξ replaced by $\xi^{(2)}$, and for the right-hand members $\nabla^{2.2}u$, $\nabla^{2.2}u_2$, etc., where $\nabla^{2.2}$ means that the operation ∇^2 has been performed twice. This process can of course go on indefinitely or until we come to such values of the η-functions that

$$\eta^{(k)}_1 dx_1 + \eta^{(k)}_2 dx_2 + \ldots . + \eta^{(k)}_i dx_i$$

is an exact differential. Instead of treating these functions $u_1, u_2 \ldots . u_i$ altogether

we may consider them combined in groups of three each; i. e. consider the motion in

$$\frac{n\,(n-1)\,(n-2)}{6}$$

flat spaces of three dimensions instead of the motion in one space of n dimensions. Equation (7) shows the relation that exists between the rotation components ξ_{jk} in such a space; of course this relation holds for all of the Euclidean spaces which can be formed from the space of n dimensions, and therefore a similar relation exists for the n-dimensional space formed by suming the expression on the left-hand side of (7) for all values of l, m, n. Write for brevity

$$\frac{n\,(n-1)\,(n-2)}{6} = I.$$

If the motion in any one of the I three dimensional spaces is rotational, it is of course rotational for the space of n dimensions.

For the space containing x_l, x_m, x_n, we have

$$\begin{aligned}
\frac{d\xi_{lm}}{dx_l} - \frac{d\xi_{mn}}{dx_n} &= \frac{d}{dx_m}\left(\frac{dn_l}{dx_l} + \frac{dn_m}{dx_m} + \frac{dn_n}{dx_n}\right) - \nabla^2 u_m \\
\frac{d\xi_{mn}}{dx_m} - \frac{d\xi_{nl}}{dx_l} &= \frac{d}{dx_n}\left(\frac{dn_l}{dx_l} + \frac{dn_m}{dx_m} + \frac{dn_n}{dx_n}\right) - \nabla^2 u_n \qquad (25) \\
\frac{d\xi_{nl}}{dx_n} - \frac{d\xi_{lm}}{dx_m} &= \frac{d}{dx_l}\left(\frac{dn_l}{dx_l} + \frac{dn_m}{dx_m} + \frac{dn_n}{dx_n}\right) - \nabla^2 u_l
\end{aligned}$$

where ∇^2 is written for

$$\frac{d^2}{dx_l^2} + \frac{d^2}{dx_m^2} + \frac{d^2}{dx_n^2}.$$

For ordinary space the quantities in parentheses vanish and these reduce to well-known forms. Write them in the forms

$$\begin{aligned}
\eta_l &= \frac{dR}{dx_l} - \nabla^2 u_l \\
\eta_m &= \frac{dR}{dx_m} - \nabla^2 u_m \qquad (26) \\
\eta_n &= \frac{dR}{dx_n} - \nabla^2 u_n
\end{aligned}$$

Form now the quantities

$$\eta_l' = \frac{d\eta_n}{dx_m} - \frac{d\eta_m}{dx_n} \qquad \eta_m' = \text{etc.} \qquad (27)$$

These operations cause the quantity R to disappear and leave us

$$\begin{aligned}\eta_l' &= \nabla^2 \xi_{mn} \\ \eta_m' &= \nabla^2 \xi_{nl} \\ \eta_n' &= \nabla^2 \xi_{lm}.\end{aligned} \tag{28}$$

Perform the same operations on the η' functions, and call the results η_l'', η_m'', η_n''.

$$\begin{aligned}\eta_l'' &= \nabla^2 \frac{dR}{dx_l} - \nabla^{2,2} u_l \\ \eta_m'' &= \nabla^2 \frac{dR}{dx_m} - \nabla^{2,2} u_m \\ \eta_n'' &= \nabla^2 \frac{dR}{dx_n} - \nabla^{2,2} u_n.\end{aligned} \tag{29}$$

This operation can be carried on indefinitely, and we shall have in each case of an η with an odd number of accents that the quantity R, or the expansion, as we may call it, disappears, while for the η's with an even number of accents it appears in the form

$$\nabla^{2k} \frac{dR}{dx}$$

k being here an odd number equal to the number of accents diminished by unity. For an incompressible fluid we have therefore a set of very simple formulas giving the relations between these various orders of motion.

We shall now introduce the equations of motion; these are

$$\begin{aligned}\frac{dU}{dx_1} &= \frac{du_1}{dt} + u_1 \frac{du_1}{dx_1} + u_2 \frac{du_1}{dx_2} + \cdots + u_n \frac{du_1}{dx_n} \\ \frac{dU}{dx_2} &= \frac{du_2}{dt} + u_1 \frac{du_2}{dx_1} + u_2 \frac{du_2}{dx_2} + \cdots + u_n \frac{du_2}{dx_n} \\ &\cdots\cdots\cdots\cdots\cdots \\ \frac{dU}{dx_n} &= \frac{du_n}{dt} + u_1 \frac{du_n}{dx_1} + u_2 \frac{du_n}{dx_2} + \cdots + u_n \frac{du_n}{dx_n}.\end{aligned} \tag{30}$$

Introducing the quantities ξ and q and writing $U - q = W$, these equations may be written

$$\begin{aligned}\frac{dW}{dx_1} &= \frac{du_1}{dt} + u_2 \xi_{12} + u_3 \xi_{13} + \cdots + u_n \xi_{1n} \\ \frac{dW}{dx_2} &= \frac{du_2}{dt} - u_1 \xi_{12} + u_3 \xi_{23} + \cdots + u_n \xi_{2n} \\ &\cdots\cdots\cdots\cdots\cdots \\ \frac{dW}{dx_n} &= \frac{du_n}{dt} - u_1 \xi_{1n} - u_2 \xi_{2n} - \cdots - u_{n-1} \xi_{n-1,n}.\end{aligned} \tag{31}$$

For steady motion the terms $\frac{du}{dt}$ vanish, and then multiplying these equations by $u_1, u_2 \ldots u_n$ respectively and adding, we have

$$u_1 \frac{dW}{dx_1} + u_2 \frac{dW}{dx_2} + \cdots + u_n \frac{dW}{dx_n} = 0 \tag{32}$$

Equations (31) may be written in the form

$$\frac{dW}{dx_k} = \frac{du_k}{dt} + \Xi_k \tag{33}$$

Then, by taking equation (5) into account, we have for the determination of W

$$\nabla^2 W = \sum_{k=1}^{k=n} \frac{d\Xi_k}{dx_k} \tag{34}$$

Take now any two of equations (10), say those indicated by the subscripts j and k; differentiate the j-equation for x_k and the k-equation for x_j, and subtract the second result from the first; continue the process until all of equations (10) have been combined two at a time by this process; we thus arrive at a group of $\frac{n(n-1)}{2}$ equations of the form

$$\begin{aligned} &\frac{d\xi_{12}}{dt} + u_1 \frac{d\xi_{12}}{dx_1} + u_2 \frac{d\xi_{12}}{dx_2} + \cdots + u_n \frac{d\xi_{12}}{dx_n} \\ &\quad + \xi_{12}\left(\frac{du_1}{dx_1} + \frac{du_2}{dx_2}\right) + \xi_{13}\frac{du_3}{dx_2} + \xi_{14}\frac{du_4}{dx_2} + \cdots + \xi_{1n}\frac{du_n}{dx_2} \\ &\quad - \xi_{23}\frac{du_3}{dx_1} - \xi_{24}\frac{du_4}{dx_1} + \cdots \xi_{2n}\frac{du_n}{dx_n} = 0 \end{aligned}$$

or generally

$$\begin{aligned} &\frac{d\xi_{jk}}{dt} + u_1 \frac{d\xi_{jk}}{dx_1} + u_2 \frac{d\xi_{jk}}{dx_2} + \cdots + u_n \frac{d\xi_{jk}}{dx_n} + \xi_{jk}\left(\frac{du_j}{dx_j} + \frac{du_k}{dx_k}\right) \\ &\quad + \xi_{1k}\frac{du_1}{dx_j} + \xi_{2k}\frac{du_2}{dx_j} + \cdots + \xi_{jn}\frac{du_n}{dx_j} \\ &\quad - \xi_{1j}\frac{du_1}{dx_k} - \xi_{2j}\frac{du_2}{dx_k} - \cdots - \xi_{ki}\frac{du_n}{dx_k} = 0. \end{aligned} \tag{35}$$

Since $\xi_{jj} = \xi_{kk} = 0$ and $\xi_{jk} = -\xi_{kj}$, we may write this equation in the form

$$\frac{d\xi_{jk}}{dt} + u_1 \frac{d\xi_{jk}}{dx_1} + u_2 \frac{d\xi_{jk}}{dx_2} + \cdots + u_n \frac{d\xi_{jk}}{dx_n} + \sum_{r=1}^{r=n} \begin{vmatrix} \xi_{rk} & \xi_{rj} \\ \frac{du_r}{dx_k} & \frac{du_r}{dx_j} \end{vmatrix} = 0 \tag{36}$$

These equations give the vortex motion in the n-dimensional space; for $n = 3$, they obviously become the ordinary equations for vortex motion.

The equations giving the motion of a fluid particle are, of course,

$$\frac{dx_1}{dt} = u_1, \frac{dx_2}{dt} = u_2 \ldots \frac{dx_n}{dt} = u_n. \tag{37}$$

Writing for brevity

$$\frac{D}{dt} = \frac{d}{dt} + u_1 \frac{d}{dx_1} + u_2 \frac{d}{dx_2} + \cdots u_n \frac{d}{dx_n}$$

equations (30) become

$$\frac{dU}{dx_1} = \frac{Du_1}{dt}, \qquad \frac{dU}{dx_2} = \frac{Du_2}{dt}, \text{ etc.} \tag{38}$$

Multiplying these by $dx_1, dx_2 \ldots$ and adding, we have readily

$$dU + dq = \frac{D}{dt}(u_1 dx_1 + u_2 dx_2 + \cdots u_n dx_n). \tag{39}$$

Integrating from a point α to another β, we have

$$\frac{D}{dt}\int_\alpha^\beta (u_1 dx_1 + u_2 dx_2 + \cdots u_n dx_n) = [U + q]_\alpha^\beta. \tag{40}$$

If α coincide with β, i. e. if we integrate around a closed curve,

$$\frac{D}{dt}\int (u_1 dx_1 + u_2 dx_2 + \cdots + u_n dx_n) = 0, \tag{41}$$

a theorem corresponding to that in hydrodynamics which states that the circulation in any closed curve moving with the fluid is independent of the time. As the principal object of this paper is to carry on and generalize the investigations begun in the paper on steady motion previously referred to, I shall leave for the present any further examination of the properties of the quantities dealt with so far and begin from a rather more general point of view. In steady motion a certain Jacobian appeared which entered into all of the work in a curious manner, this Jacobian was found from the functions θ_1, θ_2, θ_3, i. e.

$$\begin{vmatrix} \frac{d\theta_1}{dx}, & \frac{d\theta_1}{dy}, & \frac{d\theta_1}{dz} \\ \frac{d\theta_2}{dx}, & \frac{d\theta_2}{dy}, & \frac{d\theta_2}{dz} \\ \frac{d\theta_3}{dx}, & \frac{d\theta_3}{dy}, & \frac{d\theta_3}{dz} \end{vmatrix} = J. \tag{42}$$

In the present more general problem we may introduce a set of functions

$$\theta, \theta_1, \theta_2 \ldots . \theta_{n-1}$$

of $x_1, x_2 \ldots . x_n, t$, denote the Jacobian of these by J, i. e.

$$\left\| \begin{matrix} \frac{d\theta}{dx_1}, & \frac{d\theta}{dx_2}, & \ldots . & \frac{d\theta}{dx_n} \\ \frac{d\theta_1}{dx_1}, & \frac{d\theta_1}{dx_2}, & \ldots . & \frac{d\theta_1}{dx_n} \\ \frac{d\theta_{n-1}}{dx_1}, & \frac{d\theta_{n-1}}{dx_2}, & \ldots . & \frac{d\theta_{n-1}}{dx_n} \end{matrix} \right\| = J. \tag{43}$$

The minors corresponding to elements in the first row may be denoted by

$$A_{11}, A_{12}, \ldots . , A_{1n},$$

and in general for the minors to the elements in the i^{th} row

$$A_{i1}, A_{i2}, \ldots . , A_{in}.$$

Of course we have now

$$J = A_{i1} \frac{d\theta_{i-1}}{dx_1} + A_{i2} \frac{d\theta_{i-1}}{dx_2} + \ldots . + A_{in} \frac{d\theta_{i-1}}{dx_n}. \tag{44}$$

The minors A satisfy identically the equations

$$\frac{dA_{i1}}{dx_1} + \frac{dA_{i2}}{dx_2} + \ldots . + \frac{dA_{1n}}{dx_n} = 0, \quad \text{etc.} \tag{45}$$

If we substitute $A_{11}\ A_{12} \ldots . A_{1n}$ for $u_1,\ u_2 \ldots . u_n$ in equations (38) we obtain at once

$$dU = \sum_{j=1}^{j=n} \frac{DA_{1j}}{dt}\, dx_j \tag{46}$$

or

$$dU = \sum_{j=1}^{j=n} \frac{dA_{1j}}{dt}\, dx_j + \sum_{k=1}^{k=n} \sum_{j=1}^{j=n} A_{1k} \frac{dA_{1j}}{dx_k}\, dx_j. \tag{47}$$

Introducing the quantity $2q$ which is now

$$= A_{11}^2 + A_{12}^2 + \ldots . + A_{1n}^2$$

(47) becomes

$$d(U - q) = \sum_{j=1}^{j=n} \frac{dA_{1j}}{dt}\, dx_j + \sum_{k=1}^{k=n} \sum_{j=1}^{j=n} A_{1k} \left\| \begin{matrix} \frac{d}{dx_k} & \frac{d}{dx_j} \\ A_{1k} & A_{1j} \end{matrix} \right\| dx_j. \tag{48}$$

For brevity write

$$K_j = \sum_{k=1}^{k=n} A_{1k} \left\| \begin{matrix} \frac{d}{dx_k} & \frac{d}{dx_j} \\ A_{1k} & A_{1j} \end{matrix} \right\| \tag{49}$$

Assume a set of functions $n - 1$ in number

$$\Phi_1, \Phi_2, \ldots . \Phi_{n-1}$$

and write

$$\begin{aligned} K_1 &= \Phi_1 \frac{d\theta_1}{dx_1} + \Phi_2 \frac{d\theta_2}{dx_1} + \ldots + \Phi_{n-1} \frac{d\theta_n}{dx_1}, \\ K_2 &= \Phi_1 \frac{d\theta_1}{dx_2} + \Phi_2 \frac{d\theta_2}{dx_2} + \ldots + \Phi_{n-1} \frac{d\theta_n}{dx_2}, \\ &\cdots\cdots\cdots\cdots\cdots\cdots \\ K_n &= \Phi_1 \frac{d\theta_1}{dx_n} + \Phi_2 \frac{d\theta_2}{dx_n} + \ldots + \Phi_{n-1} \frac{d\theta_n}{dx_n}. \end{aligned} \tag{50}$$

Multiply each of these equations by $A_{11}, A_{12}, \ldots A_{1n}$ respectively and add: this gives

$$A_{11} K_1 + A_{12} K_2 + \ldots + A_{1n} K_n = 0 \tag{51}$$

a necessary condition, as is easily seen; for if we multiply each K as given in (49) by the minor A having the same member for its second subscript and add, there results

$$A_{11} K_1 + A_{12} K_2 + \ldots + A_{1n} K_n = \sum_{k=1}^{k=n} \sum_{j=1}^{j=n} A_{1j} A_{1k} \left(\frac{dA_{1j}}{dx_k} - \frac{dA_{1k}}{dx_j} \right). \tag{52}$$

An interchange of j with k in this should not alter the value of the right-hand member of the equation, but it obviously does alter it to the extent of changing its sign, and the quantity is therefore equal zero, or

$$A_{11} K_1 + A_{12} K_2 + \ldots A_{1n} K_n = 0.$$

For the determination of the functions Φ we may proceed as follows. Denote the minors of A^{1h} with respect to the element in the $i+1^{\text{th}}$ row and k^{th} column by A_{1h}^{ik}; then the quantity

$$\sum_{i=1}^{i=n-1} \frac{d\theta_i}{dx_j} A_{1h}^{ik}$$

represents the determinant found from A_{1h} by changing the column of elements containing differential coefficients with respect to x_k into a column containing differential coefficients with respect to x_j. In general then this determinant must vanish, as there will exist in it two columns containing the derivatives of the functions θ with respect to x_j. If $j = k$ the determinant becomes simply A_{1h}. In case $j = h$ the determinant contains no derivatives with respect to x_j and for that case

$$\sum_{i=1}^{i=n-1} \frac{d\theta_i}{dx_j} A_{1h}^{ik} = - A_{1k}$$

since

$$\frac{dA_{1j}}{d\frac{d\theta_i}{dx_k}} = - \frac{dA_{1k}}{d\frac{d\theta_i}{dx_j}}.$$

In all cases, then, when the above determinant does not vanish, it is equal to either A_{1h} or $-A_{1k}$. Multiplying it then by $\frac{dA_{1h}}{dx_k}$ and summing for h and k, from $h=1$ to $h=u$ and from $k=1$ to $k=u$ we have

$$\sum_{k=1}^{k=n}\sum_{h=1}^{h=n}\sum_{i=1}^{i=n-1}\frac{dA_{1h}}{dx_k}\frac{d\theta_i}{dx_j}A_{1h}^{ik}=\sum_{h=1}^{h=n}A_{1h}\frac{dA_{1h}}{dx_j}-\sum_{k=1}^{k=n}A_{1k}\frac{dA_{1j}}{dx_k}.$$

Now the function K_j may be written in the form

$$K_j=\sum_{k=1}^{k=n}A_{1k}\frac{dA_{1j}}{dx_k}-\sum_{h=1}^{h=n}A_h\frac{dA_h}{dx_j} \qquad (\alpha)$$

This differs from the second member of the last equation merely in sign. This equation may be written in the form

$$\sum_{i=1}^{i=n-1}\frac{d\theta_i}{dx_j}\left\{\sum_{k=1}^{k=n}\sum_{h=1}^{h=n}\frac{dA_{1h}}{dx_k}A_{1h}^{ik}\right\}=-K_j. \qquad (\beta)$$

Now since .

$$\frac{dA_{11}^{ik}}{dx_1}+\frac{dA_{12}^{ik}}{dx_2}+\ldots.+\frac{dA_{1n}^{ik}}{dx_n}=0$$

the quantity in brackets can be written

$$\sum_{k=1}^{k=n}\frac{d}{dx_k}\left\{\sum_{h=1}^{=n}A_{1h}A_{1h}^{ik}\right\} \qquad (\gamma)$$

Now as we have for the determination of the functions Φ a set of equations of the form

$$\Phi_1\frac{d\theta_1}{dx_j}+\Phi_2\frac{d\theta_2}{dx_j}+\ldots.+\Phi_n\frac{d\theta_n}{dx_j}=\sum_{k=1}^{k=n}A_{1k}\left(\frac{dA_{1j}}{dx_k}-\frac{dA_{1k}}{dx_j}\right).$$

Now observing the equations (α) and (β) we have at once by comparing the coefficients of $\frac{d\theta_i}{dx_j}$

$$\Phi_i=-\sum_{k=1}^{k=n}\sum_{h=1}^{h=n}\frac{dA_{1h}}{dx_k}A_{1h}^{ik} \qquad (53)$$

or, on taking (γ) into account

$$\Phi_i=-\sum_{k=1}^{k=n}\frac{d}{dx_k}\left\{\sum_{h=1}^{h=n}A_{1h}A_{1h}^{ik}\right\} \qquad (54)$$

Now since

$$A_{1h}^{ik}=\frac{dA_{1h}}{d\frac{d\theta_i}{dx_k}}$$

it is obvious that the quantity in brackets is the sum of the differential coefficients of $2q$ with respect to $\frac{d\theta_i}{dx_k}$ and therefore finally

$$-\Phi_i = \frac{d}{dx_1}\frac{dq}{d\frac{d\theta_i}{dx_1}} + \frac{d}{dx_2}\frac{dq}{d\frac{d\theta_i}{dx_2}} + \ldots + \frac{d}{dx_n}\frac{dq}{d\frac{d\theta_i}{dx_n}}. \tag{55}$$

If we multiply equations (50) by $A_{i-1,1}$, $A_{i-1,2}$, ..., $A_{i-1,n}$ respectively and add, we shall obviously have

$$\Phi_i = \frac{1}{J}\{A_{i-1,1}K_1 + A_{i-1,2}K_2 + \ldots + A_{i-1,n}K_n\} \tag{56}$$

a form of Φ_i from which some interesting results may be obtained. Substituting Φ_k for its value in (28) gives

$$d(U-q) = \sum_{j=1}^{j=n} \frac{dA_{1j}}{dt}\, dx_j + \sum_{k=1}^{k=n-1} \Phi_k d\theta_k \tag{57}$$

and from this we obtain at once

$$\begin{aligned}
\frac{d(U-q)}{dx_1} &= \frac{dA_{11}}{dt} + \Phi_1\frac{d\theta_1}{dx_1} + \Phi_2\frac{d\theta_2}{dx_1} + \ldots + \Phi_{n-1}\frac{d\theta_{n-1}}{dx_1} \\
\frac{d(U-q)}{dx_2} &= \frac{dA_{12}}{dt} + \Phi_1\frac{d\theta_1}{dx_2} + \Phi_2\frac{d\theta_2}{dx_2} + \ldots + \Phi_{n-1}\frac{d\theta_{n-1}}{dx_2} \\
&\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \\
\frac{d(U-q)}{dx_n} &= \frac{dA_{1n}}{dt} + \Phi_1\frac{d\theta_1}{dx_n} + \Phi_2\frac{d\theta_2}{dx_n} + \ldots + \Phi_{n-1}\frac{d\theta_{n-1}}{dx_n}
\end{aligned} \tag{58}$$

For the case of steady motion the first terms on the right side of (58) drop out and the equations take the form

$$\frac{d(U-q)}{dx_i} = \Phi_1\frac{d\theta_1}{dx_i} + \Phi_2\frac{d\theta_2}{dx_i} + \ldots + \Phi_{n-1}\frac{d\theta_{n-1}}{dx_i} \tag{59}$$

Multiplying by dx_1, dx_2, ... dx_n respectively and adding, we see that for steady motion the functions Φ are the differential coefficients with respect to θ_1, θ_2, ..., θ_{n-1} of a function.

$$W = U - q = W(\theta_1\theta_2 \ldots \theta_{n-1})$$

i. e.

$$\Phi_1 = \frac{dW}{d\theta_1}, \qquad \Phi_2 = \frac{dW}{d\theta_2} \ldots \Phi_{n-1} = \frac{dW}{d\theta_{n-1}} \tag{60}$$

The operator

$$A_{11}\frac{d}{dx_1} + A_{12}\frac{d}{dx_2} + \ldots + A_{1n}\frac{d}{dx_n}$$

is well known to be equivalent to

$$J\frac{d}{d\theta}.$$

If we multiply now equations (58) by $A_{11}, A_{12}, \ldots, A_{1n}$ respectively we have by virtue of this relation between the two operators

$$\frac{d(U-q)}{d\theta}, = \frac{dW}{d\theta}, = \frac{1}{J}\frac{dq}{dt} \tag{61}$$

and consequently

$$W = U - q = \int \frac{1}{J}\frac{dq}{dt}\, d\theta + \Psi(\theta_1\theta_2 \ldots . \theta_{n-1}t) \tag{62}$$

Ψ being a perfectly arbitrary functional symbol. This might be expressed differently; since θ is the only variable function we must have

$$\frac{d\theta_1}{dx_1}dx_1 + \frac{d\theta}{dx_2}dx_2 + \ldots . + \frac{d\theta}{dx_n}dx_n = d\theta$$

$$\frac{d\theta}{dx_1}dx_1 + \frac{d\theta_1}{dx_2}dx_2 + \ldots . + \frac{d\theta_1}{dx_n}dx_n = 0$$

. . . . . .

from which follows

$$dx_1 = \frac{A_{11}d\theta}{J}$$

$$dx_2 = \frac{A_{12}d\theta}{J}.$$

. . . .

Substituting the value of $d\theta$ thus obtained in the above equation we are enabled to express the integral in terms of $x_1, x_2, \ldots, x_n$. In order however to obtain the value of the integral in (62) it will be necessary to express $x_1x_2 \ldots . x_n$ in terms of $\theta, \theta_1, \theta_2, \ldots, \theta_{n-1}$. To this end consider the Jacobian

$$\Delta = \frac{d(\theta_1\theta_2 \ldots . \theta_{n-1}\, W)}{d(x_1x_2 \ldots . x_n)}. \tag{63}$$

The minors of Δ corresponding to $\frac{dW}{dx_1}$, $\frac{dW}{dx_2}$ . . . . are the same as the minors of J corresponding to $\frac{d\theta}{dx_1}$, $\frac{d\theta}{dx_2}$ . . . . The minor corresponding to $\frac{d\theta_i}{dx}$ is

$$\frac{dW}{dx_1}A_{1h}^{i1} + \frac{dW}{dx_2}A_{1h}^{i2} + \ldots . + \frac{dW}{dx_n}A_{1h}^{in} \tag{64}$$

which is again a Jacobian. Denote the principal minors of Δ corresponding to elements in the first row by $\Lambda_{11}, \Lambda_{12}, \ldots, \Lambda_{1n}$ and by $\Lambda_{i1}, \Lambda_{i2}, \ldots, \Lambda_{in}$ corresponding to elements in the i^{th} row. Now as we know

$$\frac{d\Lambda_{i1}}{dx_1} + \frac{d\Lambda_{i2}}{dx_2} + \ldots . + \frac{d\Lambda_{in}}{dx_n} = 0; \tag{65}$$

the quantity (64) is $= \Lambda^{ih}$, therefore (65) becomes

$$\sum_{h=1}^{h=n} \sum_{j=1}^{j=n} \frac{d}{dx_h} \left[\frac{dW}{dx_j} A_{1h}^{ij} \right] = 0. \tag{66}$$

From equations (58) we have, however,

$$\frac{dW}{dx_j} = \frac{dA_{1j}}{dt} + \Phi_1 \frac{d\theta_1}{dx_j} + \Phi_2 \frac{d\theta_2}{dx_j} + \cdots + \Phi_{n-1} \frac{d\theta_{n-1}}{dx_j}$$

Substitution of this in (66) gives a series of terms of which the first is

$$\sum_{h=1}^{h=n} \frac{d}{dx_h} \left\{ \Phi_1 \left[\frac{d\theta_1}{dx_1} a_{1h}^{i1} + \frac{d\theta_1}{dx_2} A_{1h}^{i2} + \cdots + \frac{d\theta_1}{dx_n} A_{1h}^{in} \right] \right.$$

This is $= 0$ for all values of i other than $i = 1$. Similarly for all the terms until the i^{th}; the coefficient of Φ_i is then $= A_{1h}$. Now this substitution gives before reduction

$$0 = \sum_{h=1}^{h=n} \sum_{j=1}^{j=n} \frac{d}{dx_h} \left[A_{1h}^{ij} \left(\Phi_1 \frac{d\theta_1}{dx_j} + \Phi_2 \frac{d\theta_2}{dx_j} + \cdots + \Phi_{n-1} \frac{d\theta_{n-1}}{dx_j} + \frac{dA_{1k}}{dt} \right) \right] \tag{67}$$

on performing the above described reduction this becomes

$$\sum_{h=1}^{h=n} \frac{d}{dx_h} (A_{1h} \Phi_i) + \sum_{h=1}^{h=n} \sum_{j=1}^{j=n} \frac{d}{dx_h} \left(\frac{dA_{1j}}{dt} A_{1h}^{ij} \right) = 0 \tag{68}$$

Since the first and second minors of J, i. e. A_{1h} and A_{1h}^{ij}, all satisfy identically the equation of continuity, (68) may be written in the form

$$\begin{aligned}
A_{11} \frac{d\Phi_1}{dx_1} &+ A_{12} \frac{d\Phi_1}{dx_2} + \cdots + A_{1n} \frac{d\Phi_1}{dx_n} + \Theta_1 = 0 \\
A_{11} \frac{d\Phi_2}{dx_1} &+ A_{12} \frac{d\Phi_2}{dx_2} + \cdots + A_{1n} \frac{d\Phi_2}{dx_n} + \Theta_2 = 0 \\
&\cdots\cdots\cdots\cdots\cdots\cdots\cdots \\
A_{11} \frac{d\Phi_{n-1}}{dx_1} &+ A_{12} \frac{d\Phi_{n-1}}{dx_2} + \cdots + A_{1n} \frac{d\Phi_{n-1}}{dx_n} + \Theta = 0
\end{aligned} \tag{69}$$

in which

$$\Theta_i = \sum_{h=1}^{h=n} \sum_{j=1}^{j=n} A_h^{ij} \frac{d}{dt} \frac{dA_{1j}}{dx_h} \tag{70}$$

Again, by aid of (53) we can replace (69) by

$$\begin{aligned}
A_{11} \frac{d\Phi_1}{dx_1} &+ A_{12} \frac{d\Phi_1}{dx_2} + \cdots + A_{1n} \frac{d\Phi_1}{dx_n} + \frac{d\Phi_1}{dt} = X_1 \\
A_{11} \frac{d\Phi_2}{dx_1} &+ A_{12} \frac{d\Phi_2}{dx_2} + \cdots + A_{1n} \frac{d\Phi_2}{dx_n} + \frac{d\Phi_2}{dt} = X_2 \\
&\cdots\cdots\cdots\cdots\cdots\cdots\cdots \\
A_{11} \frac{d\Phi_{n-1}}{dx_1} &+ A_{12} \frac{d\Phi_{n-1}}{dx_2} + \cdots + A_{1n} \frac{d\Phi_{n-1}}{dx_n} + \frac{d\Phi_{n-1}}{dt} = X_{n-1}
\end{aligned} \tag{71}$$

in which

$$X_i = \sum_{k=1}^{k=n} \sum_{h=1}^{h=n} \frac{dA^{1h}}{dx_k} \frac{dA^{ik}_{1h}}{dt} \tag{72}$$

The modifications undergone by (69) and (71) in the case of steady motion are obvious and need no remark.

The equations

$$\frac{dx_1}{dt} = u_1, \qquad \frac{dx_2}{dt} = u_2, \text{ etc.}$$

have been replaced by

$$\frac{dx_1}{dt} = A_{11}, \qquad \frac{dx_2}{dt} = A_{12}, \text{ etc.} \tag{73}$$

If we have

$$\frac{d\theta_k}{dt} = 0$$

then $\theta_k = \text{const.}$ is an integral of these equations, and similarly for any other of the functions θ. If

$$X_k = 0$$

then

$$\frac{d\Phi_k}{dt} = A_1 \frac{d\Phi_k}{dx_1} + A_2 \frac{d\Phi_k}{dx_2} + \cdots + \frac{d\Phi_k}{dx_n} + \frac{d\Phi_k}{dt} = X_k = 0$$

and in this case

$$\Phi_k = \text{const.}$$

is also an integral of (73). If all of the functions θ_j are independent of t, we shall have

$$\theta_1 = \text{const.}, \quad \theta_2 = \text{const.} \ldots . \theta_{n-1} = \text{const.}$$

as integrals of (73). Suppose in equations (10) that the functions u were

$$u_0\ u_1\ u_2 \ldots . u_{2n}$$

then it is known (see article of Professor Tanner's above referred to) that

$$u_0 dx_0 + u_1 dx_1 + \cdots + u_{2n} dx_{2n}$$

can always be reduced to the form

$$dM_0 + L_1 dM_1 + L_2 dM_2 + \cdots + L_n dM_n$$

and

$$u_k = \frac{dM_0}{dx_k} + L_1 \frac{dM_1}{dx_k} + \cdots + L_n \frac{dM_n}{dx_k} \tag{74}$$

In this case we should also have

$$d(U - q) = \sum_{k=0}^{k=2n} \frac{dn_k}{dt} dx_k + \tfrac{1}{2} \sum_{j=0}^{j=2n} \sum_{k=0}^{k=2n} \left(\frac{dn_k}{dx_j} - \frac{dn_j}{dx_k} \right) (u_j dx_k - u_k dx_j) \tag{75}$$

Now clearly

$$\frac{du_k}{dx_j} - \frac{du_j}{dx_k} = \sum_{r=0}^{r=2n} \begin{vmatrix} \frac{dL_r}{dx_j} & \frac{dL_r}{dx_k} \\ \frac{dM_r}{dx_j} & \frac{dM_r}{dx_k} \end{vmatrix}$$

The double sum in (75) thus becomes

$$= \sum_{r=0}^{r=2n} \begin{vmatrix} \sum_{\rho=0}^{\rho=2n} u_\rho \frac{dL_r}{dx_\rho} & \sum_{\rho=0}^{\rho=2n} \frac{dL_r}{dx_\rho} dx_\rho \\ \sum_{\rho=0}^{\rho=2n} u_\rho \frac{dM_r}{dx_\rho} & \sum_{\rho=0}^{\rho=2n} \frac{dM_r}{dx_\rho} dx_\rho \end{vmatrix}$$

and since

$$\frac{dx_j}{dt} = u_j$$

this is

$$= \sum_{r=0}^{r=2n} \left\{ dM_r \begin{vmatrix} \frac{D}{dt} & \frac{d}{dt} \\ L_r & L_r \end{vmatrix} - dL_r \begin{vmatrix} \frac{D}{dt} & \frac{d}{dt} \\ M_r & M_r \end{vmatrix} \right\}$$

Substituting this in (75) we have, after some reductions,

$$d\left[U - q - \frac{dM}{dt} - \sum_{r=0}^{r=2n} L_r \frac{dM_r}{dt}\right] = \sum_{r=0}^{r=2n} \left(\frac{dL_r}{dt} dM_r - \frac{dM_r}{dt} dL_r\right) \tag{76}$$

The equations

$$\begin{aligned} \frac{dU}{dx_0} &= \frac{du_0}{dt} + u_0 \frac{du_0}{dx_0} + u_1 \frac{du_0}{dx_1} + \cdots + u_{2n} \frac{du_0}{dx_{2n}} \\ \frac{dU}{dx_1} &= \frac{du_1}{dt} + u_0 \frac{du_1}{dx_0} + u_1 \frac{du_1}{dx_1} + \cdots + u_{2n} \frac{du_1}{dx_{2n}} \\ &\cdots\cdots\cdots\cdots\cdots\cdots\cdots \\ \frac{dU}{dx_{2n}} &= \frac{du_{2n}}{dt} + u_0 \frac{du_{2n}}{dx_0} + u_1 \frac{du_{2n}}{dx_1} + \cdots + u_{2n} \frac{du_{2n}}{dx_{2n}} \end{aligned} \tag{77}$$

and

$$\frac{du_0}{dx_0} + \frac{du_1}{dx_1} + \frac{du_2}{dx_2} + \cdots + \frac{du_{2n}}{dx_{2n}} = 0 \tag{78}$$

are thus replaced by a set of the form

$$\begin{aligned} \frac{dL_r}{dt} + u_0 \frac{dL_r}{dx_0} + u_1 \frac{dL_r}{dx_1} + \cdots + u_{2n} \frac{dL_r}{dx_{2n}} &= \frac{d\Omega}{dM_r} \\ \frac{dM_r}{dt} + u_0 \frac{dM_r}{dx_0} + u_1 \frac{dM_r}{dx_1} + \cdots + u_{2n} \frac{dM_r}{dx_{2n}} &= -\frac{d\Omega}{dL_r} \end{aligned} \tag{79}$$

(78) remaining unchanged. In (79) r has, of course, all values from 0 to $2n$, and Ω is an arbitrary function of the L's, M's, and t. For U we have now

$$U = \frac{dM_0}{dt} + \sum_{\rho=1}^{\rho=2n} L_\rho \frac{dM_\rho}{dt} + \tfrac{1}{2} \sum_{k=0}^{k=2n} \left\{ \frac{dM_0}{dx_k} + \sum_{\rho=1}^{\rho=2n} L_\rho \frac{dM_\rho}{dx_k} \right\} + \Omega \qquad (80)$$

Equations (59), which correspond to the case of steady motion, give us, on multiplication by $A_{i-1,1}$, $A_{i-1,2}$, ... $A_{i-1,n}$ and addition of the results,

$$\Phi_i = \frac{1}{J}\left(A_{i-1,1} \frac{dW}{dx_1} + A_{i-1,2} \frac{dW}{dx_2} + \cdots + A_{i-1,n} \frac{dW}{dx_n} \right) \qquad (81)$$

expressions similar to (56) for the determination of the functions Φ.

We have seen that if we have

$$\frac{D\theta_k}{dt} = 0 \qquad (82)$$

then θ_k is an integral of equations (73) or of

$$\frac{dx_1}{dt} = u_1, \frac{dx_2}{dt} = u_2 \cdots \frac{dx_n}{dt} = u_n \qquad (83)$$

In order now to obtain an idea of the nature of the functions $\theta, \theta_1 \ldots . \theta_{n-1}$, consider a function of the $n + 1$ variables $x_1, x_2 \ldots . x_n, t$, which denote by f, i. e.

$$f \equiv f(x_1, x_2 \ldots . x_n, t).$$

This function f which satisfies say

$$f = \text{const.}$$

sustains the same relation to the space of n dimensions as a function of the three variables x, y, z, and also of t sustains to ordinary space, so for want of a better term I shall speak of it as a hypersurface. Now suppose the hypersurface f to be composed always of the same particles, it must obviously satisfy the differential equation

$$\frac{df}{dt} + u_1 \frac{df}{dx_1} + u_2 \frac{df}{dx_2} + \cdots + u_n \frac{df}{dx_n} = 0 \qquad (84)$$

(84) has as we know n independent integrals which we may denote by

$$\theta, \theta_1, \theta_2 \ldots . \theta_{n-1}$$

The equations

$$\theta = \text{const.}, \quad \theta_1 = \text{const., etc.}$$

are, therefore, the equations of moving hypersurfaces which contain at all times the same fluid particles. The particles which are at any time on the intersection of any $n - 1$ of these hypersurfaces will remain on that intersection. As before we denote the Jacobian of the functions $\theta, \theta_1, \theta_2, \ldots . \theta_{n-1}$ by J. So far as it has been con-

venient from considerations of symmetry to write $\theta, \theta_1, \theta_2 \ldots . \theta_{n-1}$ as our functions, for the same reason it will now be more convenient to write $\theta_1, \theta_2, \theta_3 \ldots . \theta_n$. In all that precedes, then, the function θ is identical with the new θ_1, and in general θ_{i-1} (old notation) $= \theta_i$ (new notation). The minors of J corresponding to

$$\frac{d\theta_1}{dx_1} \frac{d\theta_1}{dx_2} \ldots . \frac{d\theta_1}{dx_n}$$

are $A_{11}, A_{12} \ldots . A_{1n}$ respectively; and similarly for the other rows.

If we solve the equations

$$\begin{aligned}
&\frac{d\theta_1}{dt} + u_1 \frac{d\theta_1}{dx_1} + u_2 \frac{d\theta_1}{dx_2} + \ldots . + u_n \frac{d\theta_1}{dx_n} = 0 \\
&\frac{d\theta_2}{dt} + u_1 \frac{d\theta_2}{dx_1} + u_2 \frac{d\theta_2}{dx_2} + \ldots . + u_n \frac{d\theta_2}{dx_n} = 0 \\
&\quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \\
&\frac{d\theta_n}{dt} + u_1 \frac{d\theta_n}{dx_1} + u_2 \frac{d\theta_n}{dx_2} + \ldots . + u_n \frac{d\theta_n}{dx_n} = 0
\end{aligned} \tag{85}$$

we find

$$\begin{aligned}
Ju_1 &= -\left\{\frac{d\theta_1}{dt} A_{11} + \frac{d\theta_2}{dt} A_{21} + \ldots . + \frac{d\theta_n}{dt} A^{n1}\right\} \\
Ju_2 &= -\left\{\frac{d\theta_1}{dt} A_{12} + \frac{d\theta_2}{dt} A_{22} + \ldots . + \frac{d\theta_n}{dt} A_{n2}\right\} \\
&\quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \\
Ju_n &= -\left\{\frac{d\theta_1}{dt} A_{1n} + \frac{d\theta_2}{dt} A_{2n} + \ldots . + \frac{d\theta_n}{dt} A_{nn}\right\}
\end{aligned} \tag{86}$$

Substituting these values of u in

$$\frac{du_1}{dx_1} + \frac{du_2}{dx_2} + \ldots . + \frac{du_n}{dx_n} = 0$$

and we find by the rule for differentiating a determinant

$$u_1 \frac{dJ}{dx_1} + u_2 \frac{dJ}{dx_2} + \ldots . + u_n \frac{dJ}{dx_n} = -\frac{dJ}{dt} \tag{87}$$

or J satisfies the equation

$$\frac{DJ}{dt} = 0. \tag{88}$$

It would be interesting to determine the effect of the operator $\frac{D}{dt}$ upon the various minors of J, but it is sufficient for the present purpose to find the effect produced upon the first minors by this operator. The method of doing this is, in the case of

A_{11}, to erase the first of equations (85) and solve the remaining $n-1$ equations for $u_2, u_3, \ldots, u_n$. We have after doing this

$$\begin{aligned} A_{11}u_2 &= -\left\{\left[\frac{d\theta_2}{dt}+u_1\frac{d\theta_2}{dx_1}\right]A_{11}^{11}+\left[\frac{d\theta_3}{dt}+u_1\frac{d\theta_3}{dx_1}\right]A_{21}^{11}+\ldots.+\left[\frac{d\theta_n}{dt}+u_1\frac{d\theta_n}{dx_1}\right]A_{n-1,1}^{11}\right\} \\ A_{11}u_3 &= -\left\{\left[\frac{d\theta_2}{dt}+u_1\frac{d\theta_2}{dx_1}\right]A_{11}^{21}+\left[\frac{d\theta_3}{dt}+u_1\frac{d\theta_3}{dx_1}\right]A_{21}^{21}+\ldots.+\left[\frac{d\theta_n}{dt}+u_1\frac{d\theta_n}{dx_1}\right]A_{n-1,1}^{21}\right\} \\ &\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \end{aligned} \tag{89}$$

Differentiate these with respect to $x_2, x_3, \ldots. x_n$ and add and we readily find

$$\frac{DA_{11}}{dt}=A_{11}\frac{du_1}{dx_1}+A_{12}\frac{du_1}{dx_2}+\ldots.+A^{1n}\frac{du_1}{dx_n}$$

and in like manner

$$\begin{aligned} \frac{DA_{12}}{dt}&=A_{11}\frac{du_2}{dx_1}+A_{12}\frac{du_2}{dx_2}+\ldots.+A_{1n}\frac{du_2}{dx_n} \\ \frac{DA_{13}}{dt}&=A_{11}\frac{du_3}{dx_1}+A_{12}\frac{du_3}{dx_2}+\ldots.+A_{1n}\frac{du_3}{dx_n} \\ &\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ \frac{DA_{1n}}{dt}&=A_{11}\frac{du_n}{dx_1}+A_{12}\frac{du_n}{dx_2}+\ldots.+A_{1n}\frac{du_n}{dx_n} \end{aligned} \tag{90}$$

If in these equations we substitute for A_{1i} the other principal minors $A_{2i}, A_{3i}, \ldots. A_{ni}$ (i having all values from $i=1$ to $i=u$ in all of these) the equations will still hold. I do not write the proof of this out in full, as it is extremely simple and yet rather tedious.

If we combine the equations $\theta=$ const. in groups of $n-1$ each, we shall of course obtain the n lines representing the intersections of n hypersurfaces represented by the equations $\theta=$ const. Call these lines s_1, $s_2, \ldots. s_n$; and denote by ds_1, $ds_2, \ldots. ds_n$ the n sides of an element of fluid occupying the space between the hypersurfaces

$$\theta_1=a_1, \qquad \theta_2=a_2 \ldots. \theta_n=a_n$$

and

$$\theta_1=a_1+da_1, \qquad \theta_2=a_2+da_2 \ldots. \theta_n=a_n+da_n.$$

We must have now

$$\begin{aligned} a_1&=\theta_1(x_1, x_2 \ldots. x_n, t) \\ a_1+da_1&=\theta_1(x_1+\lambda_{11}ds_1+x_2+\lambda_{12}ds_2 \ldots. x_n+\lambda_{1n}ds_n, t) \end{aligned} \tag{91}$$

the quantities $\lambda_{11}, \lambda_{12}, \ldots. \lambda_{1n}$ denoting the 'direction cosines' of ds_1. Similar equations of course hold for $a_2, a_3, \ldots. a_n$. By Taylor's theorem we now obtain

$$\begin{aligned} da_1 &= \left\{\lambda_{11}\frac{d\theta_1}{dx_1} + \lambda_{12}\frac{d\theta_1}{dx_2} + \ldots + \lambda_{1n}\frac{d\theta_1}{dx_n}\right\} ds_1 \\ da_2 &= \left\{\lambda_{21}\frac{d\theta_2}{dx_1} + \lambda_{22}\frac{d\theta_2}{dx_2} + \ldots + \lambda_{2n}\frac{d\theta_2}{dx_n}\right\} ds_2 \\ &\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \\ da_n &= \left\{\lambda_{n1}\frac{d\theta_n}{dx_1} + \lambda_{n2}\frac{d\theta_n}{dx_2} + \ldots + \lambda_{nn}\frac{d\theta_n}{dx_n}\right\} ds_n \end{aligned} \tag{92}$$

The values of the λ's are known to be

$$\lambda_{11} = \frac{A_{11}}{2q}, \qquad \lambda_{12} = \frac{A_{12}}{2q}, \text{ etc.} \ldots\ldots \tag{93}$$

where

$$2q = A_{11}^2 + A_{12}^2 + \ldots + A_{1n}^2. \tag{94}$$

Similar expressions hold for λ_{ji} ($j = 2, 3 \ldots n$ and $i = 1, 2 \ldots n$). The quantity $2q$ can be expressed by a determinant viz.

$$2q = \begin{vmatrix} c_{22} & c_{23} & \ldots & c^{2n} \\ c_{32} & c_{33} & \ldots & c_{3n} \\ \cdot & \cdot & & \\ \cdot & \cdot & & \\ \cdot & \cdot & & \\ c_{n2} & c_{n3} & \ldots & c^{nn} \end{vmatrix} \tag{95}$$

in which

$$\begin{aligned} c_{22} &= \sum_j \left(\frac{d\theta_2}{dx_j}\right)^2, \qquad c_{33} = \sum_j \left(\frac{d\theta_3}{dx_j}\right)^2, \text{ etc.} \ldots\ldots \\ c_{23} &= \sum_j \frac{d\theta_2}{dx_j}\frac{d\theta_3}{dx_j}\, c_{24} = \sum_j \frac{d\theta_2}{dx_j}\frac{d\theta_4}{dx_j} \text{ etc.} \ldots\ldots \end{aligned} \tag{96}$$

j taking all values from $j = 1$ to $j = n$; and $c_{ik} = c_{ki}$. Substituting the values of $\lambda_{11}, \lambda_{12}, \ldots, \lambda_{1n}$ from equations (93) in the first of equations (92) and we find at once

$$ds_1 = \frac{2q, da_1}{J}, = 2q\,\frac{d\theta_1}{J}; \tag{97}$$

similar expressions are to be found for $ds_2, ds_3, \ldots . ds_n$. Denote the projections of ds_1 on the axis by

$$dx_1^{(1)}, dx_2^{(1)}, \ldots . dx_n^{(1)};$$

then from what precedes

$$u_1 dx_1^{(1)} + u_2 dx_2^{(1)} + \ldots + u_n dx_n^{(1)} = \frac{d\theta_1}{J}\begin{vmatrix} u_1, & u_2, & \ldots, & u_n \\ \frac{d\theta_2}{dx_1}, & \frac{d\theta_2}{dx_2}, & \ldots, & \frac{d\theta_2}{dx_n} \\ \vdots & & & \\ \frac{d\theta_n}{dx_1}, & \frac{d\theta_n}{dx_2}, & \ldots, & \frac{d\theta_n}{dx_n} \end{vmatrix} \tag{98}$$

with similar expressions resulting from the projection of ds_2, ds_3, ... ds_n on the axes. Comparing these equations with (39) and writing

$$U + q = W \tag{99}$$

gives

$$\frac{D}{dt}(u_1A_{11} + u_2A_{12} + ... + u_nA_{1n})\frac{d\theta_1}{J} = dW \tag{100}$$

and by (88)

$$\frac{D}{dt}(u_1A_{11} + u_2A_{12} + ... + u_nA_{1n}) = J\frac{dW}{d\theta_1} \tag{101}$$

and in like manner

$$\frac{D}{dt}(u_1A_{21} + u_2A_{22} + ... + u_nA_{2n}) = J\frac{dW}{d\theta_2}$$

. . . . . .

$$\frac{D}{dt}(u_1A_{n1} + u_2A_{n2} + ... + u_nA_{nn}) = J\frac{dW}{d\theta_n}$$

Assume a function P such that

$$W = \frac{DP}{dt} \tag{102}$$

then since

$$A_{11}\frac{d}{dx_1} + A_{12}\frac{d}{dx_2} + ... + A_{1n}\frac{d}{dx_n} = J\frac{d}{d\theta_1} \text{ etc.} \tag{103}$$

we have

$$\begin{aligned}
u_1A_{11} + u_2A_{12} + ... + u_nA_{1n} &= J\left\{\frac{dP}{d\theta_1} + \psi_1\right\} \\
u_1A_{21} + u_2A_{22} + ... + u_nA_{2n} &= J\left\{\frac{dP}{d\theta_2} + \psi_2\right\} \\
&\cdots \\
u_1A_{n1} + u_2A_{n2} + ... + u_nA_{nn} &= J\left\{\frac{dP}{d\theta_n} + \psi_n\right\}
\end{aligned} \tag{104}$$

The functions ψ contain θ_1, θ_2, ... θ_n but not t. Solution of (104) gives

$$u_1 = \frac{d\theta_1}{dx_1}\left\{\frac{dP}{d\theta_1} + \psi_1\right\} + \frac{d\theta_2}{dx_1}\left\{\frac{dP}{d\theta_2} + \psi_2\right\} + ... + \frac{d\theta_n}{dx_1}\left\{\frac{dP}{d\theta_n} + \psi_n\right\} \text{ etc.}$$

bearing in mind that

$$\| A_{ik} \| = J^{n-1} \tag{105}$$

These equations for u_1, u_2 .... u_n may be written in the form

$$\begin{aligned}
u_1 &= \frac{dP}{dx_1} + \psi_1 \frac{d\theta_1}{dx_1} + \psi_2 \frac{d\theta_2}{dx_1} + \ldots + \psi_n \frac{d\theta_n}{dx_1} \\
u_2 &= \frac{dP}{dx_2} + \psi_1 \frac{d\theta_1}{dx_2} + \psi_2 \frac{d\theta_2}{dx_2} + \ldots + \psi_n \frac{d\theta_n}{dx_2} \\
&\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \\
u_n &= \frac{dP}{dx_n} + \psi_1 \frac{d\theta_1}{dx_n} + \psi_2 \frac{d\theta_2}{dx_n} + \ldots + \psi_n \frac{d\theta_n}{dx_n}
\end{aligned} \tag{106}$$

and from these follows

$$u_1 dx_1 + u_2 dx_2 + \ldots + u_n dx_n = dP + \psi_1 d\theta_2 + \psi_2 d\theta_2 + \ldots + \psi_n d\theta_n \tag{107}$$

This result may be obtained in another manner which will bring into evidence some interesting properties of the functions with which we are dealing. The method to be employed I shall merely indicate, as it is similar to that employed in obtaining equations (61) and (62). The original equations of motion are

$$\frac{Du_1}{dt} = \frac{dU}{dx_1}, \qquad \frac{Du_2}{dt} = \frac{dU}{dx_2} \text{ etc.} \ldots\ldots \tag{108}$$

now

$$\frac{d}{dx_i} = \frac{d\theta_1}{dx_i}\frac{d}{d\theta_1} + \frac{d\theta_2}{dx_i}\frac{d}{d\theta_2} + \ldots + \frac{d\theta_n}{dx_i}\frac{d}{d\theta_n} \tag{109}$$

and consequently

$$\begin{aligned}
\frac{Du_1}{dt} &= \frac{d\theta_1}{dx_1}\frac{dU}{d\theta_1} + \frac{d\theta_2}{dx_1}\frac{dU}{d\theta_2} + \ldots + \frac{d\theta_n}{dx_1}\frac{dU}{d\theta_n} \\
\frac{Du_2}{dt} &= \frac{d\theta_1}{dx_2}\frac{dU}{d\theta_1} + \frac{d\theta_2}{dx_2}\frac{dU}{d\theta_2} + \ldots + \frac{d\theta_n}{dx_2}\frac{dU}{d\theta_n} \\
&\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \\
\frac{Du_n}{dt} &= \frac{d\theta_1}{dx_n}\frac{dU}{d\theta_1} + \frac{d\theta_2}{dx_n}\frac{dU}{d\theta_2} + \ldots + \frac{d\theta_n}{dx_n}\frac{dU}{d\theta_n}
\end{aligned} \tag{110}$$

Multiply these by $A_{11}, A_{12}, \ldots, A_{1n}$ respectively; then by $A_{21}, A_{22}, \ldots, A_{2n}$ respectively, etc.; add in each case and we shall obtain

$$\begin{Vmatrix}
\frac{Du_1}{dt}, & \frac{Du_2}{dt}, & \ldots\ldots, & \frac{Du_n}{dt} \\
\frac{d\theta_2}{dx_1}, & \frac{d\theta_2}{dx_2}, & \ldots\ldots, & \frac{d\theta_2}{dx_n} \\
\vdots & & & \\
\frac{d\theta_n}{dx_1}, & \frac{d\theta_n}{dx_2}, & \ldots\ldots, & \frac{d\theta_n}{dx_n}
\end{Vmatrix} = J\frac{dU}{d\theta_1}, \text{ etc.} \tag{111}$$

Now we have found that

$$\frac{DA_{11}}{dt} = A_{11}\frac{du_1}{dx_1} + A_{12}\frac{du_1}{dx_2} + \ldots + A_{1n}\frac{du_1}{dx_n}$$

Using this equation, and also equation (103) and we are enabled to write at once

$$\begin{aligned}
\frac{DA_{11}}{dt} &= J\frac{du_1}{d\theta_1} \\
\frac{DA_{12}}{dt} &= J\frac{du_2}{d\theta_1} \qquad (112) \\
&\cdots\cdots \\
\frac{DA_{1n}}{dt} &= J\frac{du_n}{d\theta_1}
\end{aligned}$$

Multiplying these by $u_1, u_2, \ldots u_n$ respectively and adding the sum to (111) we obtain

$$\frac{D}{dt}\begin{vmatrix} u_1, & u_2, & \ldots, & u_n \\ \frac{d\theta_2}{dx_1}, & \frac{d\theta_2}{dx_2}, & \ldots, & \frac{d\theta_2}{dx_n} \\ \vdots & & & \\ \frac{d\theta_n}{dx_1}, & \frac{d\theta_n}{dx_2}, & \ldots, & \frac{d\theta_n}{dx_n} \end{vmatrix} = J\frac{dW}{d\theta_1}$$

there are of course $n-1$ other equations of this form which can be immediately written down. Since

$$\frac{DJ}{dt} = 0$$

we have, if we write $P = \frac{DW}{dt}$ integrate and solve the resulting equations for $u_1, u_2, \ldots u_n$ the same expressions as those marked (106).

NOTE. — I desire here to call attention to the paper published by Professor Rowland in the American Journal of Mathematics, Vol. III. No. 3, in which a full account of the so-called higher orders of motion is contained. (I may also mention that I am informed by Professor Rowland that he gave a brief account of these motions at the meeting of the Scientific Association of the Johns Hopkins University on October 6th).

The existence of these motions was discovered at about the same time independently by Professor Rowland and myself. He was led to consider them while treating of the equations of electromagnetism, and their connection with fluid motion. I was led to similar results by the study of certain possible cases of steady motion in viscous fluids, an account of which will be found in the Journal of the Franklin Institute for October, 1880, and also in the Philosophical Magazine for November, 1880.

I had devised no simple means of determining the lower orders of motion in terms of the higher orders, but had merely derived the higher orders from the lower by obvious processes of differentiation. In Professor Rowland's paper an elegant solution of the much more difficult problem is given. I may further say that up to the time of my becoming acquainted with Professor Rowland's research I had found no physical interpretation of these quantities so that the entire credit for the development of the theory of these motions is due solely to Professor Rowland. In the present paper the quantities corresponding to the higher orders of motion are denoted by the letter η with different accents and subscripts. My work on the subject of the higher orders of motion is to be found in the paper quoted at the beginning of this article, "General Properties of the Equations of Steady Motion." I believe that Professor Rowland has made no use of the integrating factors which I have there introduced. This part of the subject I hope to go into quite fully in Part II. of the present paper.

WASHINGTON, D. C.
January 2, 1881.

V.

A Comparison of the Harvard College Observatory Catalogue of Stars for 1875.0 *with the Fundamental Systems of Auwers, Safford, Boss, and Newcomb.*

BY WILLIAM A. ROGERS.

Presented December 14, 1881.

Since the actual construction of the catalogue of stars found in Volume XII. of the "Annals of Harvard College Observatory," five catalogues of the principal stars of the heavens have been independently formed; for the most part from complete discussions of all the data available previous to the year 1872. I name them in the order of their publication.

(*a*) Fundamental-Catalog für die Zonen-Beobachtungen am nördlichen Himmel; herausgegeben im Auftrage der Zonen-Commission der astronomischen Gesellschaft.

Von A. Auwers.

(*b*) U. S. Geographical Surveys. Lieut. Geo. M. Wheeler, Corps of Engineers, in charge. Catalogue of 2018 Stars for Jan. 1, 1875.

By T. H. Safford, Ph.D.

(*c*) U. S. Northern Boundary Commission. Declinations of Fixed Stars.

By Lewis Boss,
Director, Dudley Observatory.

(*d*) Catalogue of 1098 Standard Clock and Zodiacal Stars, prepared under the direction of

Simon Newcomb,
Professor U. S. N., Superintendent American Ephemeris.

(*e*) Verzeichniss von 83 südlichen Sternen zur Fortsetzung des Fundamental-Catalogs für die Zonen-beobachtungen am Nordhimmel bis zum 31. Grade südlicher Declination.

Von A. Auwers.

The first of these catalogues contains the positions of 539 stars, symmetrically distributed over the entire heavens as far as 10° south declination. The authorities upon which the coördinates of these stars depend are as follows: —

Pulkowa	1845
Pulkowa	1865
Pulkowa	1871
Greenwich	1836–1876
Harvard College	1871–2
Leipsic[1]	1866–1870
Leiden[1]	1864–1870

The fifth catalogue of the series is to be regarded as a continuation of the first. It depends upon the same authorities as the first, with the addition of the following: —

Cape of Good Hope	1860
Williamstown	1861–1863
Melbourne	1870
Safford; Harvard College Observations	1862–1865
Yarnall	General Catalogue.
Washington	1872–1875

The proper motions of the catalogue of 539 stars depend upon a comparison of the modern observations with the unpublished coördinates resulting from a re-discussion of Bradley's observations, by Dr. Auwers.

The catalogue of Safford extends from 12 hours to 2 hours of right ascension. Since the field operations of the survey by Lieutenant Wheeler were limited to the summer and autumn months, it was necessary to include in the catalogue only such stars as could be made available in this work. The positions given, rest upon the available authorities between 1755 and 1875. The right ascensions are given to hundredths of seconds of time, and the declinations to tenths of seconds of arc. The author considers the right ascensions as provisional only (Introduction, p. 9), but it will be seen hereafter that the agreement with the fundamental system of Auwers is, with a very few exceptions, good, after the systematic differences between the two systems have been applied. For the most part, Mädler's values of the proper motion were employed in the reductions in right ascension. The proper motions in declination depend upon Auwers-Bradley, Piazzi, and Groombridge combined with the modern observations. Bessel's constants of precession were used in the reductions.

[1] In declination only.

The catalogue of Boss gives the exact coördinate in declination only, the right ascension being given only to tenths of seconds of time. The observations of Bessel, 1821, of Struve, 1824, and of Argelander, 1829, combined with modern observations, form the basis of this admirable system of declinations. The author has given an elaborate discussion of the systematic corrections of each catalogue employed when referred to this normal system, and from these corrected positions the present catalogue was constructed. The departure from the usual practice of assuming Bradley's observations for 1755 as absolute, in the determination of proper motions, will not meet with universal approval; but there are many reasons which may be given in its favor. It may be safely assumed that the normal system constructed by Professor Boss fairly represents the observations of Bessel, Struve, and Argelander. When, therefore, we find that the proper motions derived from this normal system differ systematically from those derived from the Auwers-Bradley positions, we may conclude that there is an inherent discordance between the two systems. Without attempting to decide which is correct, it is well worth while to be able to establish the fact of the discordance, since it bears a close relation to the questions of precession, of proper motion, and of the motion of the solar system in space.

With reference to the formation of this normal system the author says: —

"It will be shown that the interval of time between the group of early determinations by Bessel (1821), Struve (1824), and Argelander (1829), and the later ones at Leiden, Melbourne, Greenwich, and Washington observatories (not to mention intermediate catalogues), is quite sufficient for an independent judgment as to the approximate accuracy and consequent weight of Bradley's results, and that a reliable system of corrections to the various catalogues may be founded on a discussion of recent catalogues alone, taking as the earliest that of Bessel for the mean epoch 1821."

Struve's constants of precession were used throughout in the formation of this catalogue.

The catalogue of Newcomb was constructed mainly "for the purpose of obtaining standard positions of reference stars for use in the lunar and planetary theories, especially in the reduction of the older occultations." The right ascensions are referred to the author's fundamental system of equatorial stars published in the appendix to the Washington Observations for 1870. The right ascensions of the polar stars are taken without change from Dr. Gould's discussion in 1861. The declinations are referred to the system of Boss. Struve's constants of precession were employed in the reductions.

The Harvard College Observations for 1871–2, published in Vol. X. of the Annals of the Observatory, extend from April 26, 1871, to May 22, 1872. They depend upon the places of the first or the provisional catalogue of 539 stars published in

1869 [Vierteljahrsschrift der astronomischen Gesellschaft. 1869. pp. 324–349]. This catalogue consists of 336 principal stars, whose positions were at that time known within narrow limits, and of 203 secondary stars whose places were known with less precision. These two catalogues, however, form a nearly homogeneous system.

The catalogue for 1875, published in Vol. XII. of the Annals was constructed from the catalogue in Vol. X., combined with two series of observations made during the years 1874 and 1875. It is to be noted, however, that these two catalogues are not strictly comparable. The Pulkowa observations of the "Zusatzsterne" were published by Professor Struve in 1874 [Vol. IX., pp. 83–88, "Vierteljahrsschrift der astronomischen Gesellschaft"]. Under the supposition that the corrections to the provisional places given in this publication were to be employed in the reduction of the zone observations, they were used in the reductions of the Harvard College observations for 1874 and 1875. But it will appear from the table given below that the systematic deviation of the Pulkowa observations from the final positions of the same stars given in Publication XIV. of the Gessellschaft, are quite large, especially in declination. In so far, therefore, as these stars were used in the determination of the instrumental constants for the years 1874 and 1875, there is a departure from the system upon which the catalogue for 1872 is based.

Designating the entire provisional catalogue by P and the stars of this catalogue which were used in the reduction of the Harvard College Observations by P' we have the following relations between Auwers, Struve P and P'. In the comparison with P' *all* the stars of the list are included, but in the comparison with P, 18 stars in right ascension and 8 stars in declination were omitted on account of the magnitude of the residuals: —

δ	Auwers *minus* P.		Auwers *minus* P'.		Auwers *minus* Struve.	
	$\Delta\alpha$	$\Delta\delta$	$\Delta\alpha$	$\Delta\delta$	$\Delta\alpha$	$\Delta\delta$
	s	"	s	"	s	"
−10 . . . + 0	+.004	+0.13	+.001	+0.13	+.016	−0.23
+ 0 . . . −10	+.014	+ .21	+.014	+ .21	+.006	+ .26
+10 . . . −20	+.016	+ .03	+.019	− .04	+.025	+ .16
+20 . . . +30	+.010	+ .09	+.012	+ .12	+.024	+ .36
+30 . . . −40	+.036	+ .02	+.039	+ .00	+.038	+ .79
+40 . . . −50	+.050	+ .30	+.054	+ .34	+.039	+ .50
+50 . . . +60	+.030	+ .60	+.049	+ .58	+.045	+ .58
+60 . . . +70	+.064	+ .51	+.065	+ .53	+.031	+ .34
+70 . . . −85	+.067	+ .45	+.066	+ .48	+.025	+ .00

The corrections given above may be assumed to be true for the mean declination of the group to which they belong, and for twelve hours of right ascension. It is

apparent, however, from the following comparison of Auwers with P' that the correction belonging to any group cannot be regarded as constant for every right ascension of that group.

AUWERS *minus* P.

R. A.	$\Delta\alpha$								
	−10°...+0°	+0°...+10°	+10°...+20°	+20°...+30°	+30°...+40°	+40°...+50°	+50°...+60°	+60°...+70°	+70°...+85°
h. h.	s.	s.	s.	s.	s.	s.	s.	s.	s.
0 ... 6	−.011	+.014	+.010	+.011	+.039	+.046	+.027	+.117	+.162
6 ... 12	+.011	+.014	+.010	+.014	+.061	+.062	−.008	+.096	+.052
12 ... 18	+.003	+.007	+.031	+.000	−.009	+.081	+.069	−.016	+.036
18 ... 24	+.019	+.021	+.021	+.017	+.069	+.043	+.097	+.044	+.027
	$\Delta\delta$								
	″	″	″	″	″	″	″	″	″
0 ... 6	+0.19	+0.44	−0.13	+0.25	−0.11	+0.31	+0.74	+0.30	+0.40
6 ... 12	+ .55	+ .39	+ .26	+ .26	+ .14	+ .74	+ .93	+ .88	+ .65
12 ... 18	− .14	− .13	− .14	− .10	− .12	+ .06	+ .46	+ .29	+ .43
18 ... 24	− .06	+ .00	− .09	+ .01	+ .11	+ .35	+ .25	+ .73	+ .47

DATA FOR THE REDUCTIONS TO THE SYSTEM OF AUWERS.

δ	Auwers *minus* Harv. Coll.		Auwers *minus* Safford.		Auwers *minus* Boss.	Auwers *minus* Newcomb.	
	$\Delta\alpha$	$\Delta\delta$	$\Delta\alpha$	$\Delta\delta$	$\Delta\delta$	$\Delta\alpha$	$\Delta\delta$
° °	s.	″	s.	″	″	s.	″
−31 ... −25	−.037	−1.07	....	....	....	−.005	−0.70
−31 ... −20	−.027	− .73	....	....	−0.72	−.010	− .71
−25 ... −15	−.014	− .38	....	....	....	−.001	− .64
−20 ... −10	−.020	+ .20	....	....	− .49	+.003	− .55
−15 ... − 5	−.007	+ .38	....	....	....	+.000	− .39
−10 ... + 0	−.010	+ .41	....	....	− .24	−.005	− .25
− 5 ... + 5	−.015	+ .19	....	....	....	−.012	− .12
+ 0 ... +10	+.007	− .07	....	....	− .16	−.005	− .11
+ 5 ... +15	+.016	+ .11	+.037	−0.39	....	−.006	− .19
+10 ... +20	+.012	+ .26	+.034	− .37	− .21	−.004	− .20
+15 ... +25	+.019	+ .30	+.025	− .31	....	+.000	− .14
+20 ... +30	+.033	+ .17	+.029	− .25	− .01	−.004	− .07
+25 ... +35	+.037	+ .09	+.028	− .28	....	−.005	− .06
+30 ... +40	+.035	+ .15	+.016	− .24	− .05	−.008	+ .01
+35 ... +45	+.039	+ .23	+.029	− .23	....	−.005	+ .00
+40 ... +50	+.046	+ .28	+.044	− .11	− .07	−.006	+ .05
+45 ... +55	+.050	+ .04	+.052	+ .00	....	−.006	+ .07
+50 ... +60	+.034	+ .03	+.037	+ .18	+ .04	−.007	+ .08
+55 ... +65	+.025	+ .24	+.031	+ .25	....	+.030	+ .06
+60 ... +70	+.048	+ .35	+.038	+ .27	+ .07	+.057	+ .10
+65 ... +75	+.057	+ .38	+.041	+ .25	....	+.044	+ .11
+70 ... +85	+.042	+ .13	....	....	+ .12	−.032	+ .09
+75 ... +85	+.017	− .04	....	....	....	−.077	+ .10

The corrected residuals, in the case of Safford, in declination, of Boss and of Newcomb, are so nearly constant, for each group, when arranged in the order of declination, that it may be safely assumed that they are not a function of the right ascension. In the case of Harvard College and of Safford, in right ascension, the evidence is decisive that the residuals in certain groups vary with the right ascension. This is to be expected in the case of the Harvard College observations, since the deviations of the fundamental system upon which they depend, from the system of publication XIX. are functions both of the declination and of the right ascension. The provisional catalogue designated *P* is based upon Bessel's constants of precession. The same remark applies to Safford's catalogue. For the conversion from the constants of Bessel to those of Struve, we have the following relations between the annual variations in α and δ for 1875.0 : —

$$\text{Struve} = \text{Bessel} + {}^{s}.001123 + {}^{s}.000129 \tan\delta \sin\alpha.$$

$$\text{Struve} = \text{Bessel} + ''.00194 \cos\alpha.$$

It will be seen from these relations that the change in the right ascension in a century may be as great as $0^{s}.11$ for a star on the equator, while the change in declination will be insignificant, the maximum value being only $0''.19$. It is also apparent that the residuals, especially in right ascension in the column Auwers *minus P*, are for the most part due to the change from the constants of Bessel to those of Struve.

For the more complete reduction to the system of Auwers, we have the following additional data.

AUWERS *minus* HARVARD COLLEGE.

δ	$0^h \ldots 6^h$		$6^h \ldots 12^h$		$12^h \ldots 18^h$		$18^h \ldots 24^h$	
	$\Delta\alpha$	$\Delta\delta$	$\Delta\alpha$	$\Delta\delta$	$\Delta\alpha$	$\Delta\delta$	$\Delta\alpha$	$\Delta\delta$
	s.	"	s.	"	s.	"	s.	"
−31 . . . −25	−.037	−1.07	−.037	−1.07	−.037	−1.07	−.037	−1.07
−31 . . . −20	−.058	− .77	−.004	− .16	−.010	−1.19	−.021	− .90
−25 . . . −15	−.045	− .63	−.014	− .03	+.005	− .60	−.018	− .35
−20 . . . −10	−.046	− .09	−.026	− .31	+.002	− .32	−.014	− .10
−15 . . . − 5	−.015	+ .46	−.027	+ .08	−.005	+ .25	+.005	− .67
−10 . . . − 0	−.007	+ .31	−.026	+ .76	−.002	+ .25	−.006	+ .37
− 5 . . . − 5	−.017	+ .07	+.000	+ .53	−.015	+ .38	−.017	+ .01
− 0 . . . +10	+.007	− .36	+.023	+ .15	−.003	+ .34	−.007	− .49
+ 5 . . . +15	+.017	− .02	+.026	+ .32	−.010	+ .04	+.018	− .06
+10 . . . +20	+.009	+ .32	+.019	+ .72	+.000	+ .05	+.020	+ .15
+15 . . . +25	+.009	+ .32	+.015	+ .66	+.008	+ .02	+.043	+ .08
+20 . . . +30	+.024	+ .17	+.015	+ .54	+.041	+ .03	+.052	− .02

AUWERS *minus* HARVARD COLLEGE. — Continued.

δ	$0^h \ldots 6^h$		$6^h \ldots 12^h$		$12^h \ldots 18^h$		$18^h \ldots 24^h$	
	Δα	Δδ	Δα	Δδ	Δα	Δδ	Δα	Δδ
° °	s.	″	s.	″	s.	″	s.	″
+25 . . . +35	+.044	+ .11	+.023	+ .29	+.038	+ .05	+.038	− .08
+30 . . . +40	+.028	+ .15	+.027	+ .47	+.036	− .11	+.061	+ .02
+35 . . . +45	+.025	+ .22	+.047	+ .56	+.032	− .14	+.055	+ .34
+40 . . . +50	+.043	+ .25	+.051	+ .47	+.034	+ .08	+.057	+ .29
+45 . . . +55	+.044	+ .05	+.057	+ .37	+.043	+ .00	+.065	− .26
+50 . . . +60	+.041	− .04	+.023	+ .11	+.007	+ .05	+.058	+ .01
+55 . . . +65	+.049	+ .30	+.018	+ .15	−.018	+ .19	+.060	+ .24
+60 . . . +70	+.078	+ .28	+.048	+ .39	−.006	+ .35	+.045	+ .38
+65 . . . +75	+.098	+ .25	+.056	+ .36	+.015	+ .53	+.059	+ .35
+70 . . . +85	+.065	− .18	+.039	+ .36	+.001	+ .34	+.061	+ .03
+75 . . . +85	+.041	− .22	−.007	+ .36	−.007	+ .04	+.047	− .33

AUWERS *minus* SAFFORD.

δ	Δα				
	$12^h \ldots 15^h$	$15^h \ldots 18^h$	$18^h \ldots 21^h$	$21^h \ldots 24^h$	$0^h \ldots 2^h$
° °	s.	s.	s.	s.	s.
+ 5 . . . +15	+.018	+.027	+.058	+.036	+.045
+10 . . . +20	+.014	+.027	+.048	+.033	+.053
+15 . . . +25	+.005	+.022	+.042	+.030	+.037
+20 . . . +30	+.004	+.017	+.050	+.043	+.029
+25 . . . +35	+.002	+.013	+.026	+.041	+.045
+30 . . . +40	+.007	−.003	+.012	+.030	+.060
+35 . . . +45	+.014	+.018	+.014	+.056	+.055
+40 . . . +50	+.019	+.049	+.022	+.069	+.068
+45 . . . +55	+.042	+.035	+.072	+.050	+.088
+50 . . . +60	+.004	+.033	+.100	+.043	+.042
+55 . . . +65	+.004	+.045	+.040	+.063	+.026
+60 . . . +70	−.020	+.029	+.013	+.048	+.052
+65 . . . +70	−.013	+.024	+.010	+.080	+.090

In the reduction of a given series of observations from the system of one fundamental catalogue to that of another system, it is obvious that the most independent method of procedure would be to apply to the given series the systematic corrections derived from comparing the system upon which it is based with that to which it is to be reduced. The fact already stated that the Harvard College Catalogue for 1875 depends upon two systems which differ systematically, makes it imperative that the comparison shall be made directly with the system of Auwers. There is also an additional consideration which makes it necessary that this course should be pursued. It

will be seen from the values of $\Delta\alpha$ under Auwers *minus* P' from $+70°$ to $+85°$ that the right ascensions of the Polar stars between 0^h and 6^h are about $.10^s$ too small, while those from 6^h to 18^h are nearly $.10^s$ too great. Hence, in the determination of the instrumental constant n, the values derived from observations made between January and April will be too large, while the values derived from observations made between April and September will be too small. For stars beyond $10°$ south declination therefore, systematic errors in right ascension will be introduced through n, which will not be corrected by a close adherence to the fundamental system.

In the conversion from one fundamental system to another, two methods have been employed: —

(*a*) *The Analytical Method.*

If we have a series of residuals $\Delta\alpha$, arranged in the order of right ascension, which are strictly circular functions we may always have: —

$$\Delta\alpha = \text{a constant} + m \sin\alpha + n \cos\alpha + m' \sin 2\alpha + n' \cos 2\alpha, \text{ etc.} \quad (1)$$

If $\Delta\alpha$ is a function of the declination we may have approximately the additional equation: —

$$\Delta\alpha = \text{a constant} + a \sin\delta + b \cos\delta. \quad (2)$$

In practice it will ordinarily be sufficient to assume: —

$$\Delta\alpha = \text{a constant} + m \sin\alpha + n \cos\alpha + a \sin\delta + b \cos\delta. \quad (3)$$

In Volume X. of the Annals of the Observatory the values of $\Delta\alpha$ were first computed from equation (1). The computed values having been subtracted from the observed values, a new series of residuals was obtained which were assumed to be functions of the declination. New values of $\Delta\alpha$ were then computed from equations of the form (2). The total correction was then assumed to be the sum of these two computed partial residuals.

For the residuals in declination we may with less exactness assume: —

$$\Delta\delta = \text{a constant} + c \sin\delta + d \cos\delta.$$

(*b*) *The Graphical Method.*

If we assume any given unit in right ascension as a horizontal argument, and an aliquot part of $\Delta\alpha$ as a vertical argument, it is obvious that points representing $\Delta\alpha$ may be laid off which will bear a definite relation to a fixed horizontal line. If a smooth curve is drawn through these points, values of $\Delta\alpha$ nearly representing observation may be derived for any right ascension by reading off the vertical co-ordinate passing through the curve at this point. By a similar method of procedure we may obtain the values of $\Delta\delta$ which represent the observations.

Each of these methods has its strenuous advocates. The objection most frequently urged against the first method is that in an analytical solution, extended to terms of the second order only, there can be only two points of inflexion in a curve representing the computed residuals. If therefore the residuals between two systems are really represented by a curve which has several points of inflexion, the analytical method must be less exact than the method of graphic curves. Again, it often happens that residuals having the same sign and nearly the same magnitude are concentrated at one point. The effect of the analytical solution is to distribute the assumed errors at this point over the whole system in such a way that the sum of the squares of the residuals shall be as small as possible. But if these errors are real, they belong to this point only, and they should *not* be distributed over the whole system.

The objection to the second method is that for a given series of points representing $\Delta\alpha$ or $\Delta\delta$, no two persons would describe exactly the same curve. This objection is to a certain extent obviated by the plan of successive bisections of the lines joining the points, described by Professor Pickering in Vol. X. of the Annals of the Observatory. In drawing a curve by this method, two points require attention. First, that the uncertainty with regard to the ends of the curve will be increased in proportion to the number of bisections, and second, that each successive bisection causes the curve to approach a straight line. In order to draw a regular curve, it will rarely be necessary to make more than three bisections. It is my custom to use the curve drawn through the final bisecting points as a guide in drawing the curve most nearly representing the observations. To this extent, therefore, the final curve is dependent upon the judgment of the computer. The uncertainty thus introduced will rarely exceed $.005^s$ for any residual in α, and will, I think, never exceed $.01^s$. It is obvious that the case in which this uncertainty is the greatest is that in which there is a sudden change in the direction of the curve, followed by a nearly flat curve for three or four points of the horizontal argument, and this in turn followed by a sharp return to the original direction.

As illustrations of the degree of conformity which may be expected from the two methods, I give below in parallel columns the observed residuals, the residuals derived from the equations, and those derived from the graphic curves, for the following authorities: —

Catalogues compared.		*Equations.*
I.	Auwers *minus* P'; $\Delta\alpha$ from $+70°$ to $+85°$	$\Delta\alpha = +.069^s + .065^s m + .041^s n + .029^s m' + .011^s n'$
II.	Auwers *minus* H. C. O.; $\Delta\alpha$ from $+70°$ to $+85°$	$\Delta\alpha = +.033^s + .007^s m + .029^s n - .009^s m' - .001^s n'$
III.	Auwers *minus* Struve; $\Delta\delta$ from $+70°$ to $+85°$	$\Delta\delta = +.03'' - .08'' m - .20'' n + .03'' m' + .09'' n'$
IV.	Auwers *minus* Safford; $\Delta\delta$ from $+10°$ to $+70°$	$\Delta\delta = -.09'' + .57 c - .48 d$

$\Delta\alpha$

α	I. Observation.	I. Equation.	I. Curve.	I. $O-E$	I. $O-C$	II. Observation.	II. Equation.	II. Curve.	II. $O-E$	II. $O-C$
h. h.	s.	s.	s.	s.	s.	s.	s.	s.	s.	s.
0 ... 2	+.154	+.149	+.135	+.005	+.019	—.008	+.058	+.046	—.066	—.054
2 ... 4	+.187	+.173	+.173	+.014	+.014	+.121	+.050	+.070	+.071	+.051
4 ... 6	+.128	+.149	+.138	—.021	—.010	+.050	+.043	+.064	+.007	—.014
6 ... 8	+.086	+.097	+.117	—.011	—.031	+.019	+.039	+.020	—.020	—.001
8 ... 12	+.119	+.057	+.077	+.062	+.042	—.013	+.026	+.026	—.039	—.039
10 ... 12	—.041	+.041	+.015	—.082	—.056	+.051	+.010	+.016	+.041	+.035
12 ... 14	+.096	+.036	+.001	+.060	+.095	+.001	—.002	+.008	+.003	—.007
14 ... 16	—.007	+.023	+.001	—.030	—.008	—.009	—.002	—.004	—.007	—.005
16 ... 18	+.023	+.060	+.011	+.023	+.012	+.009	+.015	+.010	—.006	—.001
18 ... 20	—.025	—.009	+.025	—.016	—.050	+.035	+.039	+.038	—.004	—.003
20 ... 22	+.035	+.023	+.043	+.012	—.008	+.078	+.058	+.068	+.020	+.010
24 ... 0	+.078	+.086	+.075	—.008	+.003	+.063	+.062	—.060	+.001	+.003

$\Delta\delta$

α	III. Observation	III. Equation	III. Curve.	III. $O-E$	III. $O-C$	δ	IV. Observation.	IV. Equation.	IV. Curve.	IV. $O-E$	IV. $O-C$
h. h.	"	"	"	"	"		"	"	"	"	"
0 ... 2	+.03	—.08	—.07	+.11	+.10	+10 ... +15	—.39	—.46	—.39	+.07	+.00
2 ... 4	—.16	—.14	—.15	—.02	—.01	+10 ... +20	—.37	—.41	—.36	+.04	—.01
4 ... 6	—.31	—.17	—.18	—.14	—.13	+15 ... +25	—.31	—.35	—.31	+.04	+.00
6 ... 8	—.21	—.09	—.11	—.12	—.10	+20 ... +30	—.25	—.29	—.27	+.04	+.02
8 ... 10	+.32	+.08	+.15	+.24	+.17	+25 ... +35	—.28	—.28	—.26	+.00	—.02
10 ... 12	+.14	+.26	+.22	—.12	—.08	+30 ... +40	—.24	—.16	—.23	—.08	—.01
12 ... 14	+.17	+.33	+.24	—.16	—.07	+35 ... +45	—.18	—.10	—.18	—.08	+.00
14 ... 16	+.27	+.26	+.24	+.01	+.03	+40 ... +50	—.11	—.03	—.11	—.08	+.00
16 ... 18	+.18	+.10	+.18	+.08	+.00	+45 ... +55	+.00	+.04	+.00	—.04	+.00
18 ... 20	—.07	—.03	—.01	—.04	—.06	+50 ... +60	+.18	+.11	+.16	+.07	+.02
20 ... 22	—.22	—.08	—.13	—.14	—.09	+55 ... +65	+.25	+.17	+.25	+.08	+.00
22 ... 0	—.16	—.08	—.12	—.08	—.04	+60 ... +70	+.27	+.23	+.26	+.04	+.01
.....	...	...	...	...	...	+65 ... +75	+.25	+.29	+.27	—.04	—.02

The residuals under Auwers *minus P'* and Auwers *minus* H. C. O. involve comparatively large accidental errors. Those under Auwers *minus* Struve, and especially those under Auwers *minus* Safford, are nearly free from accidental errors. While there is a close agreement between the values, $O-E$ and $O-C$, in every case, it is obvious that in the first two cases there is little to choose between the two methods, but that in the last two cases, the graphic method yields the best results.

The choice of the method to be used depends, for the most part, upon the magnitude of the accidental errors, but unfortunately it is often impossible to decide whether the errors are real or accidental. The graphic method is by far the most expeditious, and with hardly an exception it may be safely followed.

Both of these methods of comparing different catalogues, are open to the objection that the coördinates of any given star, when referred in this way to a normal system, may differ by a small amount from the values of the coördinates derived by a direct reduction of the instrumental constants from the fundamental stars of the system. I estimate the uncertainty arising in this way to be $.015^s$ in $\Delta\alpha$ and $0.20''$ in $\Delta\delta$. In the reduction of the zone stars observed at the Harvard College Observatory, the instrumental constants from 1871 to 1876 have been recomputed from the positions given in Publication XIV. When, therefore, the final catalogue is completed, the data will be at hand for a definite determination of the amount of this uncertainty. But since this reduction is wholly impracticable in the case of catalogues already published finally, some method of reducing different catalogues to a homogeneous system is a necessity in the determination of proper motions.

Admitting this necessity, that method is to be preferred which will reduce the residuals in $\Delta\alpha$ and $\Delta\delta$ to a minimum, *whatever the order or the limits of the groups into which they may be divided.*

The method pursued in this investigation is the following: —

(*a*) The residuals are first arranged in the order of declination. The mean values for any group represent nearly the corrections for the mean declination of that group and for twelve hours of right ascension.

(*b*) The residuals for each group minus the mean value for that group, are then arranged in the order of right ascension, and a graphic curve is drawn through the points representing these values. Each curve will give a series of values for the even hours of right ascension, which are arranged in vertical columns, the horizontal argument being the mean declination. It will be seen that the values in the vertical columns are derived from the same curve, while those in the horizontal columns are derived from different curves. In order to connect the different groups in declination, a curve is drawn through the points represented by the residuals in the horizontal columns. This will, of course, disturb to a slight extent the values already found in the vertical columns, but they can be rectified in the way already described. A second approximation will ordinarily give smooth curves for both the vertical and the horizontal arguments. In this investigation, however, I have preferred to retain the values derived directly from the original curves without any attempt to smooth them.

(*c*) On account of the limited number of the residuals which usually compose the groups arranged in the order of declination, there is danger of introducing systematic errors in drawing the graphic curves. Hence after the sum of the two residuals already found has been subtracted from the original residuals, the new values are

arranged in the order of right ascension and a curve is drawn through the points thus found.

REDUCTION OF THE HARVARD COLLEGE OBSERVATIONS TO THE SYSTEM OF AUWERS.

It is not considered necessary to give the details of the reductions which form the basis of the tables given below. After the sum of the corrections determined by the method described above from groups between the limits $\delta = -10°$ and $\delta = +80°$ had been applied, it was found that the deviations from the normal system were as follows: —

AUWERS *minus* HARVARD COLLEGE.

Residuals in α.

Limits δ	$\Delta\alpha$	Limits in δ	$\Delta\alpha$	Limits in δ	$\Delta\alpha$	Limits in α	$\Delta\alpha$
° °	s.	° °	s.	° °	s.	h. h.	s.
−30 . . . −25	−.006	−31.5 . . . −27.5	−.010	−30 . . . −25	−.004	0 . . . 2	+.003
−25 . . . −20	−.001	−27.5 . . . −22.5	−.004	−25 . . . −15	+.000	2 . . . 4	+.000
−20 . . . −15	+.007	−22.5 . . . −17.5	+.005	−15 . . . − 5	+.004	4 . . . 6	+.000
−15 . . . −10	−.009	−17.5 . . . −12.5	−.001	− 5 . . . + 5	−.009	6 . . . 8	−.001
−10 . . . − 5	+.012	−12.5 . . . − 7.5	+.009	+ 5 . . . +15	−.003	8 . . . 10	−.005
− 5 . . . − 0	−.002	− 7.5 . . . − 2.5	+.003	+15 . . . +25	−.002	10 . . . 12	+.004
+ 0 . . . + 5	−.016	− 2.5 . . . + 2.5	−.006	+25 . . . +35	+.004	12 . . . 14	+.001
+ 5 . . . +10	+.001	+ 2.5 . . . + 7.5	−.011	+35 . . . +45	+.002	14 . . . 16	+.003
+10 . . . +15	−.007	+ 7.5 . . . +12.5	+.002	+45 . . . +55	+.003	16 . . . 18	−.003
+15 . . . +20	−.002	+12.5 . . . +17.5	−.006	+55 . . . +65	+.004	18 . . . 20	+.002
+20 . . . +25	−.002	+17.5 . . . +22.5	−.001	+65 . . . +75	−.003	20 . . . 22	+.002
+25 . . . +30	+.007	+22.5 . . . +27.5	+.000	+75 . . . +85	−.014	22 . . . 24	+.003
+30 . . . +35	+.003	+27.5 . . . +32.5	+.003	. . . . .	. . .	. . . .	. . .
+35 . . . +40	+.003	+32.5 . . . +37.5	+.005	. . . . .	. . .	. . . .	. . .
+40 . . . +45	+.003	+37.5 . . . +42.5	+.003	. . . . .	. . .	. . . .	. . .
+45 . . . +50	+.005	+42.5 . . . +47.5	+.005	. . . . .	. . .	. . . .	. . .
+50 . . . +55	−.001	+47.5 . . . +52.5	+.002	. . . . .	. . .	. . . .	. . .
+55 . . . +60	+.003	+52.5 . . . +57.5	+.001	. . . . .	. . .	. . . .	. . .
+60 . . . +65	+.006	+57.5 . . . +62.5	−.001	. . . . .	. . .	. . . .	. . .
+65 . . . +70	−.009	+62.5 . . . +67.5	−.002	. . . . .	. . .	. . . .	. . .
+70 . . . +75	+.005	+67.5 . . . +72.5	−.006	. . . . .	. . .	. . . .	. . .
+75 . . . +80	−.014	+72.5 . . . +77.5	−.002	. . . . .	. . .	. . . .	. . .
+80 . . . +85	−.003	+77.5 . . . +82.5	−.025	. . . . .	. . .	. . . .	. . .

Residuals in δ.

Limits in α	−30°..−15°	−15°..+5°	+5°..+25°	+25°..+45°	+45°..+65°	+65°..+85°	Limits in α	−30°..−10°	−10°..+5°	+5°..+20°	+20°..+35°	+35°..+50°	+50°..+65°	+65°..+85°
h. h.	″	″	″	″	″	″	h. h	″	″	″	″	″	″	″
0 . . . 3	+.06	−.34	+.03	+.00	+.14	−.17	0 . . . 4	+.11	+.07	−.03	+.01	+.03	−.01	−.15
3 . . . 6	−.25	+.21	−.10	−.06	−.05	−.16	4 . . . 8	+.21	+.36	+.14	−.02	−.07	+.04	−.33
6 . . . 9	+.23	+.00	+.21	+.03	+.00	−.30								
9 . . . 12	+.36	+.18	+.08	−.05	+.09	+.14	8 . . . 12	+.24	+.16	+.02	−.03	−.04	−.01	+.16
12 . . . 15	−.43	−.15	−.19	−.19	+.00	+.02	12 . . . 16	+.05	+.22	−.13	−.08	−.07	−.11	+.05
15 . . . 18	−.12	−.10	−.17	+.03	−.03	+.13								
18 . . . 21	+.12	−.22	+.06	+.26	−.03	−.09	16 . . . 20	+.17	−.18	+.01	+.06	−.09	−.09	+.02
21 . . . 24	−.42	−.05	−.12	+.16	−.06	+.09	20 . . . 24	+.05	−.17	−.13	+.19	+.12	−.07	−.08
Means by Weights.	−.06	−.07	−.02	+.02	+.01	−.04	Means by Weights.	+.14	+.06	−.02	+.02	−.02	−.04	−.05

It did not seem necessary to recompute the double argument corrections in α, but for the terms depending on α and δ new curves were drawn from the values of $\Delta\alpha$ given above, and the secondary corrections obtained were applied to the corresponding values given by the first set of curves.

The residuals in declination, however, appeared to require a complete second approximation. Accordingly, new curves were drawn from the residuals in δ, in the manner described above. The results from the two approximations are combined in the following tables.

$\Delta\alpha$. AUWERS *minus* HARVARD COLLEGE.

Corrections depending on δ						Corrections depending on α							
δ	Δα	δ	Δα	δ	Δα	α	Δα	α	Δα	α	Δα	α	Δα
°	s.	°	s.	°	s.	h.	s.	h.	s.	h.	s.	h.	s.
−30	−.048	+ 2	−.011	+45	+.049	0.0	−.004	5.0	−.014	12.4	+.006	17.5	+.004
−28	−.041	+ 4	−.009	+50	+.050	0.2	−.007	5.5	−.022	12.6	+.002	18.0	+.007
−26	−.033	+ 6	−.003	+52	+.047	0.4	−.010	6.0	−.026	12.8	−.001	18.2	+.009
−24	−.027	+ 8	+.001	+54	+.042	0.6	−.009	6.2	−.025	13.0	−.005	18.4	+.014
−22	−.021	+10	+.004	+56	+.038	0.8	−.001	6.4	−.021	13.2	−.008	18.6	+.017
−20	−.017	+12	+.007	+58	+.037	1.0	+.013	6.6	−.017	13.6	−.010	18.8	+.019
−18	−.013	+14	+.009	+60	+.036	1.2	+.017	7.0	−.014	14.0	−.011	19.0	+.019
−16	−.010	+16	+.011	+62	+.038	1.6	+.018	7.4	−.011	14.2	−.014	19.4	+.007
−14	−.007	+18	+.014	+64	+.043	2.0	+.015	7.8	−.007	14.4	−.019	19.8	+.014
−12	−.006	+20	+.018	+66	+.047	2.4	+.013	8.0	−.006	14.6	−.022	20.0	+.010
−10	−.005	+22	+.024	+68	+.048	2.8	+.007	8.5	−.002	15.0	−.017	20.5	+.005
− 5	−.005	+24	+.028	+70	+.048	3.0	+.005	9.0	+.003	15.2	−.008	21.0	+.007
− 4	−.007	+26	+.032	+72	+.045	3.2	+.002	9.5	+.010	15.4	−.004	22.0	+.007
− 3	−.010	+28	+.035	+74	+.042	3.4	−.001	10.0	+.018	15.6	−.002	22.5	+.005
− 2	−.012	+30	+.038	+76	+.036	3.6	−.003	11.0	+.021	15.8	+.000	23.0	+.003
− 1	−.014	+35	+.041	+78	+.025	3.8	−.007	11.5	+.016	16.0	−.001	23.4	−.005
+ 0	−.015	+40	+.044	+80	+.013	4.0	−.008	12.0	+.012	16.5	−.002	23.8	−.006
. . .	. . . .	. . .	. . . .	. . .	. . . .	4.5	−.010	12.2	+.009	17.0	−.002	0.0	−.004

$\Delta\alpha$. Corrections depending on both α and δ.

[*In units of the third decimal place.*]

h.	−30°	−25°	−20°	−15°	−10°	−5°	0°	+5°	+10°	+15°	+20°	+25°	+30°	+35°	+40°	+45°	+50°	+55°	+60°	+65°	+70°	+75°	+80°
0	−23	−18	−14	− 9	− 6	−3	−1	+1	+ 2	+4	+5	+ 6	+ 7	+ 7	+ 6	− 5	− 5	+ 8	+11	+14	+16	+20	+23
1	−21	−18	−14	−10	− 7	−4	−1	+0	+ 1	+2	+2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 3	+ 8	+12	+16	+19	+22	+25
2	−17	−16	−14	−10	− 7	−4	−1	+0	+ 1	+1	+1	+ 0	− 1	− 2	− 3	− 2	+ 2	+11	+21	+24	+24	+22	+15
3	−11	−14	−14	−12	− 7	−2	+0	+1	+ 2	+1	+0	− 2	− 4	− 5	− 6	− 4	− 1	+ 9	+17	+22	+22	+21	+14
4	− 7	−11	−13	−13	− 9	−4	+0	+4	+ 4	+3	+0	− 2	− 4	− 6	− 6	− 4	− 1	+ 7	+17	+24	+21	+20	+10
5	− 1	− 7	−13	−14	−10	−3	−1	+4	+ 5	+3	+0	− 4	− 6	− 6	− 6	− 4	− 1	+ 5	+13	+24	+26	+21	+ 7
6	− 5	− 5	−11	−12	−11	−5	+3	+8	+ 7	+2	−4	− 6	− 7	− 7	− 6	− 3	− 0	+ 5	+12	+22	+22	+20	+ 6
7	− 9	− 1	−10	−12	−11	−7	−4	+9	+ 9	+2	−5	− 8	− 9	− 7	− 4	− 1	− 1	+ 4	+11	+22	+24	+15	− 2
8	−10	+ 0	− 7	−11	−12	−9	−5	+9	+ 8	+3	−5	−10	− 9	− 6	− 1	+ 2	+ 2	+ 2	+ 7	+20	+20	+13	− 3
9	+ 9	+ 0	− 6	− 9	−11	− 8	−5	+9	+ 8	+3	−4	− 9	− 9	− 6	+ 1	+ 4	+ 3	− 0	+ 2	+18	+19	+10	− 4
10	+ 8	+ 4	− 3	− 7	− 8	−6	−5	+9	+ 8	+3	−3	− 8	− 8	− 5	+ 0	+ 2	+ 2	− 1	− 1	+15	+17	+ 7	− 6
11	+ 5	+ 5	+ 0	− 3	− 5	−4	−4	+6	+ 5	+2	−2	− 6	− 7	− 3	+ 1	− 1	+ 0	− 5	− 3	+ 6	+ 8	+ 3	− 6
12	+ 5	+ 4	+ 1	+ 0	+ 0	+0	+2	+1	+ 1	+0	−1	− 3	− 5	− 2	− 1	− 1	− 3	− 6	− 7	− 2	− 1	− 4	−10
13	+ 7	+ 6	+ 5	+ 1	+ 3	+1	+0	− 2	− 3	−4	−4	− 3	− 3	− 2	− 2	− 3	− 6	−11	−13	−13	−14	−14	−14
14	+10	+ 9	+ 9	+ 8	+ 6	+3	+0	− 5	− 8	−6	+0	+ 2	+ 1	+ 0	− 2	− 4	− 8	−15	−18	−19	−20	−21	−21
15	+ 8	+10	+11	+11	+ 8	+4	+0	− 7	−11	−7	+1	+ 2	+ 2	+ 0	− 2	− 5	− 9	−15	−19	−21	−22	−22	−22
16	+ 9	+11	+12	+11	+10	+6	− 2	− 8	−11	−7	+3	+ 6	+ 4	+ 2	− 1	− 5	− 8	−11	−16	−21	−25	−26	−20
17	+ 7	+10	+12	+12	+10	+6	− 4	− 9	−10	−5	+5	+ 6	+ 5	+ 3	+ 0	− 2	− 5	−11	−19	−23	−25	−21	−10
18	+ 3	+ 8	+11	+12	+10	+5	− 4	− 9	− 8	−2	+5	+ 6	+ 6	+ 6	+ 5	+ 3	+ 1	− 2	− 8	−18	−21	−15	− 5
19	− 1	+ 6	+ 9	+11	+10	+7	− 3	− 6	− 4	+1	+5	+ 7	+ 8	+ 8	+ 8	+ 9	+ 8	+ 8	+ 3	− 9	−14	− 5	+ 5
20	− 2	+ 5	+ 7	+ 8	+ 8	+5	− 3	− 5	− 2	+2	+5	+ 8	+ 9	+10	+10	+10	+11	+13	+ 7	− 7	−12	− 2	+13
21	− 2	+ 0	+ 3	+ 7	+ 8	+6	+ 4	− 1	+3	+7	+ 9	+11	+11	+11	+11	+13	+18	+14	+ 2	− 4	− 6	+18	
22	− 3	− 3	− 2	+ 1	+ 5	+4	+ 3	− 4	− 1	+5	+7	+ 9	+11	+12	+12	+14	+15	+15	+13	+ 5	+ 7	−11	+20
23	−12	−11	− 9	− 3	+ 0	+1	−2	− 3	− 1	+5	+6	+ 8	+ 8	+ 9	+ 8	+ 8	+ 9	+13	+12	+10	+11	−15	+22

$\Delta\delta$. Auwers *minus* Harvard College.

Corrections depending on δ.

δ	$\Delta\delta$	δ	$\Delta\delta$	δ	$\Delta\delta$	δ	$\Delta\delta$	δ	$\Delta\delta$	δ	$\Delta\delta$	δ	$\Delta\delta$	δ	$\Delta\delta$
°	″	°	″	°	″	°	″	°	″	°	″	°	″	°	″
−30	−1.03	−15	+.16	+ 0	+.17	− 15	+.34	−30	+.13	−45	+.21	−60	+.23	+75	+.19
−29	− .97	−14	+.26	+ 1	+.07	−16	+.36	−31	+.12	−46	+.19	−61	+.27	+76	+.14
−28	− .89	−13	+.34	+ 2	+.01	−17	+.37	−32	+.12	−47	+.14	−62	+.29	+77	+.06
−27	− .81	−12	+.41	+ 3	−.02	−18	+.37	−33	+.13	−48	+.08	−63	+.32	+78	+.00
−26	− .68	−11	+.48	+ 4	−.04	−19	+.37	−34	+.13	−49	+.01	−64	+.33	+79	−.06
−25	− .62	−10	+.52	+ 5	−.05	−20	+.37	−35	+.14	−50	−.03	−65	+.34	+80	−.18
−24	− .54	− 9	+.53	+ 6	−.05	−21	+.36	−36	+.16	−51	−.06	−66	+.35	+81	−.23
−23	− .47	− 8	+.53	+ 7	−.05	−22	+.34	−37	+.17	−52	−.08	−67	+.35	+82	−.25
−22	− .40	− 7	+.53	+ 8	−.04	−23	+.30	−38	+.19	−53	−.08	−68	+.35	+83	−.33
−21	− .32	− 6	+.53	+ 9	−.02	−24	+.26	−39	+.20	−54	−.08	−69	+.35	+84	−.38
−20	− .27	− 5	+.51	+10	+.00	−25	+.23	−40	+.21	−55	−.06	−70	+.34	+85	−.41
−19	− .20	− 4	+.44	+11	+.06	−26	+.21	−41	+.22	−56	−.03	−71	+.33	+86	−.42
−18	− .13	− 3	+.41	+12	+.17	−27	+.17	−42	+.22	−57	+.02	−72	+.31	+87	−.43
−17	− .06	− 2	+.35	+13	+.26	−28	+.15	−43	+.22	−58	+.10	−73	+.28	+88	−.43
−16	+ .04	− 1	+.27	+14	+.30	−29	+.13	−44	+.22	−59	+.17	−74	+.24	+90	−.43

Δδ. *Corrections depending on α.*

α	Δδ	α	Δδ	α	Δδ	α	Δδ
h.	″	h.	″	h.	″	h.	″
0.0	−.18	4.5	−.10	10.0	+.21	21.0	+.09
0.2	−.04	5.0	−.10	11.0	+.23	21.2	+.05
0.4	+.03	6.0	−.11	12.0	+.21	21.4	+.03
0.6	+.05	7.0	−.10	13.0	+.18	21.6	+.00
0.8	+.07	7.5	−.06	14.0	+.14	21.8	−.02
1.0	+.10	8.0	−.03	15.0	+.08	22.0	−.04
1.5	+.13	8.2	−.01	15.5	+.04	22.2	−.06
2.0	+.12	8.4	+.01	16.0	+.02	22.4	−.08
2.2	+.10	8.6	+.03	17.0	+.00	22.6	−.10
2.4	+.07	8.8	+.06	18.0	+.01	22.8	−.12
2.6	+.05	9.0	+.09	18.5	+.04	23.0	−.13
2.8	+.02	9.2	+.12	19.0	+.07	23.2	−.14
3.0	−.01	9.4	+.16	19.5	+.10	23.4	−.15
3.5	−.05	9.6	+.19	20.0	+.11	23.6	−.16
4.0	−.08	9.8	+.20	20.5	+.12	0.0	−.18

Δδ. Corrections depending on both α and δ.

[*In units of the second decimal place.*]

h	−30°	−25°	−20°	−15°	−10°	−5°	+0°	+5°	+10°	+15°	+20°	+25°	+30°	+35°	+40°	+45°	+50°	+55°	+60°	+65°	+70°	+75°	+80°
0	− 6	− 7	− 8	−10	−14	−21	−26	−25	−22	−17	−13	− 6	− 1	+ 2	+ 5	+ 5	+ 4	+ 3	+1	− 4	− 3	−22	−32
1	+ 4	+ 1	− 2	− 4	− 9	−17	−22	−20	−17	−12	− 7	− 3	+ 1	+ 4	+ 5	+ 6	+ 7	+ 6	+2	− 5	−13	−23	−32
2	− 5	− 4	− 6	− 8	−11	−17	−26	−25	−15	− 7	− 2	+ 1	+ 2	+ 4	+ 5	+ 7	+ 8	+ 8	+6	+ 0	− 9	−21	−32
3	−14	−12	−12	−10	− 9	−10	−17	−16	−10	− 2	+ 1	+ 3	+ 3	+ 3	+ 5	+ 7	+ 8	+ 5	+1	− 8	−19	−29	−36
4	−11	− 9	− 5	− 2	+ 1	+ 1	− 1	− 4	− 2	+ 4	+ 7	+ 6	+ 6	+ 5	+ 6	+ 5	+ 4	+ 1	−4	−11	−19	−27	−31
5	− 5	− 7	− 5	− 1	+ 3	+ 5	+ 3	+ 1	+ 4	+ 9	+11	+10	+ 9	+ 7	+ 6	+ 4	+ 2	− 1	−6	−13	−20	−26	−28
6	+ 8	+ 6	+ 8	+12	+14	+16	+17	+18	+21	+24	+23	+20	+17	+16	+14	+12	+ 8	+ 4	−2	−10	−17	−22	−20
7	+36	+31	+26	+20	+18	+19	+21	+26	+32	+33	+33	+30	+27	+23	+19	+16	+11	+ 5	−4	−12	−18	−21	−17
8	+54	+44	+34	+22	+15	+22	+31	+34	+35	+35	+34	+32	+29	+26	+23	+19	+15	+ 6	−5	−12	−17	−17	−10
9	+66	+56	+42	+22	+16	+28	+35	+37	+38	+38	+37	+32	+29	+24	+21	+19	+16	+10	+3	− 3	− 7	− 5	+ 7
10	+50	+49	+42	+25	+18	+31	+34	+35	+34	+32	+30	+28	+23	+21	+19	+20	+18	+15	+9	+ 4	+ 5	+10	+22
11	+38	+29	+21	+10	+ 7	+23	+28	+27	+23	+17	+12	+ 7	+ 6	+ 6	+ 7	+ 8	+ 9	+ 9	+8	+ 8	+ 8	+11	+25
12	−12	−17	−14	−14	−11	+ 2	+ 6	+ 8	+ 8	− 1	− 4	− 7	− 8	− 6	− 4	− 3	− 1	+ 2	+5	+ 7	+10	+14	+22
13	−41	−42	−30	−23	−18	− 4	+ 0	+ 1	− 4	−15	−19	−20	−21	−20	−19	−15	−10	− 5	+2	+ 7	+11	+15	+18
14	−47	−44	−37	−30	−21	−12	− 3	− 2	−12	−25	−28	−25	−23	−24	−25	−21	−16	− 8	−1	+ 6	+11	+13	+12
15	−51	−48	−40	−31	−25	−19	− 9	− 8	−15	−30	−30	−26	−23	−24	−27	−23	−15	− 9	+0	+ 8	+14	+17	+12
16	−56	−48	−35	−19	−18	−14	−11	−12	−17	−30	−31	−28	−25	−22	−19	−18	−14	−10	−2	+ 6	+15	+19	+14
17	−56	−31	−22	−17	−14	−14	−15	−18	−23	−30	−29	−23	−17	−13	−13	−13	−14	−14	−4	+ 4	+10	+14	+13
18	−37	−26	−18	−12	−11	−15	−18	−21	−22	−24	−21	−13	− 8	− 5	− 4	− 5	− 6	− 6	−1	+ 2	+ 6	+ 7	− 2
19	−23	−19	−14	− 7	− 7	−13	−20	−22	−21	−18	−12	− 7	− 2	+ 1	+ 1	− 3	− 6	− 5	−3	− 2	− 2	− 4	−17
20	−19	−16	−15	−11	−12	−15	−23	−25	−22	−19	−12	− 5	+ 0	+ 2	+ 3	+ 1	− 3	− 4	−3	− 2	− 3	− 7	−20
21	−35	−30	−26	−19	−17	−19	−29	−30	−25	−20	−15	− 6	+ 0	+ 3	+ 4	+ 1	− 4	− 5	−3	− 1	+ 0	− 3	−16
22	−35	−36	−30	−22	−20	−21	−32	−31	−28	−22	−16	− 8	+ 1	+ 2	+10	+ 7	+ 2	− 2	−2	− 4	− 4	− 7	−14
23	−24	−28	−26	−21	−21	−26	−31	−29	−26	−21	−15	− 8	+ 1	+ 5	+14	+ 0	− 3	− 3	−3	− 4	− 5	−10	−16

The following example will illustrate the use of the tables: —

Reduction of the Coördinates of ν Orionis to the System of Auwers.

		h.	m.	s.	°	′	″
$\alpha_0 =$		6	0	26.127	$\delta_0 = +14$	46	52.05
Corrections.	1			+.010			+.33
	2			−.026			−.11
	3			+.002			+.24
$\alpha =$		6	0	26.113	$\delta = +14$	46	52.51

In the formation of the catalogue which follows, the corrections were for convenience taken from the tables derived from the separate approximations. On account of the slight uncertainty in the interpolations from the double argument tables, an occasional deviation of four or five units from the results given by the final table of corrections given above may be found.

AUWERS *minus* SAFFORD.

$\Delta\alpha$. *Corrections depending on* δ.

δ	$\Delta\alpha$	δ	$\Delta\alpha$	δ	$\Delta\alpha$
°	s.	°	s.	°	s.
−10	+.038	−35	+.024	−43	+.038
−12	+.036	−36	+.024	−44	+.041
−14	+.034	−37	+.025	−45	+.043
−16	+.031	−38	+.026	−50	+.045
−18	+.030	−39	+.027	−55	+.039
−20	+.029	−40	+.028	−60	+.034
−25	+.026	−41	+.031	−65	+.035
−30	+.024	−42	+.038	−70	+.042

$\Delta\delta$. *Corrections depending on* δ.

δ	$\Delta\delta$	δ	$\Delta\delta$	δ	$\Delta\delta$	δ	$\Delta\delta$
°	″	°	″	°	″	°	″
+10	−0.39	+25	−0.27	+40	−0.18	+55	+0.16
+11	−0.38	+26	−0.27	+41	−0.18	+56	+0.19
+12	−0.38	+27	−0.26	+42	−0.16	+57	+0.21
+13	−0.37	+28	−0.26	+43	−0.15	+58	+0.22
+14	−0.37	+29	−0.26	+44	−0.13	+59	+0.24
+15	−0.36	+30	−0.26	+45	−0.11	+60	+0.25
+16	−0.35	+31	−0.26	+46	−0.09	+61	+0.26
+17	−0.34	+32	−0.25	+47	−0.07	+62	+0.26
+18	−0.33	+33	−0.25	+48	−0.05	+63	+0.26
+19	−0.32	+34	−0.24	+49	−0.05	+64	+0.26
+20	−0.31	+35	−0.23	+50	−0.03	+65	+0.26
+21	−0.30	+36	−0.22	+51	+0.00	+66	+0.27
+22	−0.29	+37	−0.21	+52	+0.03	+67	+0.27
+23	−0.28	+38	−0.20	+53	+0.05	+68	+0.27
+24	−0.27	+39	−0.19	+54	+0.09	+70	+0.27

AUWERS *minus* SAFFORD.

$\Delta\delta$. *Corrections depending on both α and δ.*

[*In units of the third decimal place.*]

α	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
h.													
12	−25	−26	−27	−29	−27	−19	−19	−20	−22	−25	−28	−33	−39
13	−23	−21	−22	−25	−24	−17	−16	−18	−20	−23	−25	−30	−37
14	−19	−17	−18	−22	−21	−14	−13	−14	−16	−18	−20	−24	−30
15	−15	−14	−14	−17	−17	−13	−11	−11	−12	−13	−14	−16	−19
16	−10	−10	−11	−12	−13	−10	− 8	− 8	− 8	− 8	− 9	−10	−12
17	− 3	− 3	− 5	− 8	− 9	− 8	− 7	− 5	− 3	− 3	− 3	− 3	− 3
18	+ 5	+ 2	+ 1	− 2	− 4	− 6	− 7	− 5	+ 0	+ 2	+ 3	+ 3	+ 2
19	+10	+ 9	+ 5	+ 3	+ 1	− 3	− 5	− 2	+ 5	+12	+13	+11	+ 7
20	+ 9	+11	+11	+10	+ 5	+ 0	+ 0	+ 1	+ 8	+16	+19	+15	+10
21	+ 6	+ 8	+ 9	+11	+ 8	+ 4	+ 3	+ 4	+11	+16	+18	+15	+11
22	+ 2	+ 5	+ 7	+ 9	+11	+10	+10	+11	+12	+15	+16	+15	+16
23	+ 2	+ 4	+ 7	+10	+13	+16	+18	+17	+16	+16	+15	+16	+17
0	+ 5	+ 7	+ 9	+12	+17	+21	+25	+23	+19	+12	+10	+14	+18
1	+ 9	+10	+10	+13	+19	+26	+29	+26	+17	+ 9	+ 9	+15	+17
2	+13	+14	+15	+16	+21	+29	+30	+30	+20	+ 7	+ 8	+16	+20

NOTE. — The residuals in α depending on α alone are so small that I have not considered it worth while to introduce them.

AUWERS *minus* BOSS.

$\Delta\delta$ *Corrections depending on δ.*

δ	$\Delta\delta$	δ	$\Delta\delta$	δ	$\Delta\delta$	δ	$\Delta\delta$
°	″	°	″	°	″	°	″
−30	−0.79	+ 0	−0.20	+30	−0.04	+60	+0.05
−28	− .75	+ 2	− .18	+32	− .04	+62	+ .06
−26	− .71	+ 4	− .18	+34	− .04	+64	+ .07
−24	− .67	+ 6	− .18	+36	− .05	+66	+ .08
−22	− .64	+ 8	− .18	+38	− .05	+68	+ .09
−20	− .60	+10	− .19	+40	− .06	+70	+ .10
−18	− .56	+12	− .19	+42	− .06	+72	+ .10
−16	− .51	+14	− .19	+44	− .05	+74	+ .11
−14	− .46	+16	− .17	+46	− .05	+76	+ .11
−12	− .41	+18	− .15	+48	− .04	+78	+ .12
−10	− .36	+20	− .11	+50	− .02	+80	+ .12
− 8	− .32	+22	− .07	+52	+ .00	+82	+ .12
− 6	− .27	+24	− .05	+54	+ .01	+84	+ .13
− 4	− .24	+26	− .04	+56	+ .03	+86	+ .13
− 2	− .22	+28	− .04	+58	+ .05	+88	+ .13

AUWERS *minus* NEWCOMB.

$\Delta\alpha$ *Corrections depending on* δ.						$\Delta\delta$ *Corrections depending on* δ.							
δ	$\Delta\alpha$	δ	$\Delta\alpha$	δ	$\Delta\alpha$	δ	$\Delta\delta$	δ	$\Delta\delta$	δ	$\Delta\delta$	δ	$\Delta\delta$
°	s.	°	s.	°	s.	°	″	°	″	°	″	°	″
−30	−.010	− 8	−.002	+35	−.007	−30	−0.73	− 4	−0.22	+22	−0.12	+48	+0.05
−28	−.009	− 6	−.001	+40	−.007	−28	− .72	− 2	− .17	+24	− .10	+50	+ .07
−26	−.008	− 4	−.005	+45	−.006	−26	− .70	+ 0	− .13	+26	− .08	+55	+ .08
−24	−.006	− 2	−.007	+50	−.006	−24	− .68	+ 2	− .12	+28	− .06	+60	+ .09
−22	−.004	+ 0	−.008	+55	−.005	−22	− .66	+ 4	− .12	+30	− .04	+65	+ .09
−20	−.002	+ 5	−.007	+56	−.004	−20	− .64	+ 6	− .13	+32	− .03	+70	+ .10
−18	+.000	+10	−.005	+57	−.002	−18	− .60	+ 8	− .15	+34	− .02	+75	+ .10
−16	+.001	+15	−.004	+58	+.000	−16	− .57	+10	− .18	+36	+ .00	+80	+ .10
−14	+.001	+20	−.003	+59	+.001	−14	− .51	+12	− .18	+38	+ .01	+85	+ .10
−12	+.000	+25	−.003	+60	+.002	−12	− .45	+14	− .18	+40	+ .02	+90	+ .10
−10	−.001	+30	−.005	+61	+.003	−10	− .40	+16	− .18	+42	+ .03	. .	. . .
. .	. . .	. .	. . .	. .	. . .	− 8	− .34	+18	− .17	+44	+ .04	. .	. . .
. .	. . .	. .	. . .	. .	. . .	− 6	− .27	+20	− .14	+46	+ .04	. .	. . .

CATALOGUE OF 334 PRIMARY STARS

OBSERVED DURING THE YEARS 1871, 1872, 1874, AND 1875,

WITH THE

MERIDIAN CIRCLE OF HARVARD COLLEGE OBSERVATORY,

AND REDUCED TO THE FUNDAMENTAL SYSTEM OF AUWERS,

FOR THE EPOCH 1875.0.

NAME OF STAR.	Right Ascensions for 1875.0.	Auwers *minus* H. C. O.	*Safford *minus* H. C. O.	*Newcomb *minus* H. C. O.	Declinations for 1875.0.	Auwers *minus* H. C. O.	*Safford *minus* H. C. O.	*Boss *minus* H. C. O.	*Newcomb *minus* H. C. O.
	h. m. s.	s.	s.	s.	° ′ ″	″	″	″	″
α Andromedæ .	0 1 55.762	−.002	−.012	−.002	+28 24 0.87	−0.08	−0 03	−0.16	−0.14
22 Andromedæ .	0 3 49.774	+.014	+.082	. . .	+45 22 34.92	+0.23	+0.38	. . .	. . .
γ Pegasi . . .	0 6 48.032	+.007	+.017	+.006	+14 29 18.26	+0.29	+0.07	+0.22	+0.23
Groom. 29 . .	0 9 10.378	−.170	. . .	. . .	+76 15 21.68	−0.25	. . .	. . .	. . .
ι Ceti	0 13 3.534	−.003	. . .	. . .	− 9 31 1.76	−0.16	. . .	. . .	. . .
12 Ceti	0 23 39.591	+.000	. . .	−.023	− 4 38 53.81	−0.11	. . .	. . .	−0.04
κ Cassiopeiæ . .	0 25 54.558	−.008	+.009	. . .	+62 14 29.33	+0.21	+0.33	+0.41	. . .
α Cassiopeiæ . .	0 33 25.459	−.003	+.049	+.039	+55 51 5.34	−0.17	+0.05	−0.20	−0.15
21 Cassiopeiæ . .	0 37 25.845	−.063	. . .	. . .	+74 18 15.37	+0.22	. . .	+0.42	+0.40
ζ Andromedæ .	0 40 42.946	−.008	+.023	. . .	+23 35 12.13	+0.15	+0.30	+0.50	. . .
η Cassiopeiæ . .	0 41 32.938	−.090	−.061	. . .	+57 9 8.22	+0.02	−0.31	+0.05	. . .
γ Cassiopeiæ . .	0 49 10.699	−.019	+.004	. . .	+60 2 21.12	+0.26	+0.43	+0.43	. . .
ε Piscium . . .	0 56 27.429	−.006	. . .	−.023	+ 7 13 0.10	−0.12	. . .	−0.35	−0.31
44 H. Cephei . .	1 1 32.954	+.008	. . .	. . .	+79 0 27.64	−0.56	. . .	. . .	. . .
β Andromedæ .	1 2 44.300	+.001	+.040	−.016	+34 57 25.95	+0.17	+0.32	+0.10	+0.14
τ Piscium . . .	1 4 46.792	+.019	−.010	. . .	+29 25 31.93	−0.40	+0.51	. . .	. . .
α Ursæ Minoris .	1 12 59.929	+.112	. . .	. . .	+88 38 33.55	+0.30	. . .	+0.45	+0.41
ψ Cassiopeiæ . .	1 17 7.625	+.035	−.001	. . .	+67 28 35.18	+0.50	+0.69	. . .	. . .
θ Ceti	1 17 46.554	+.008	. . .	−.020	− 8 49 44.83	−0.03	. . .	+0.16	+0.13
η Piscium . . .	1 24 47.791	+.008	−.006	+.006	+14 42 2.39	−0.18	+0.05	+0.07	+0.07
υ Persei . . .	1 30 19.726	−.010	−.052	. . .	+47 59 38.07	+0.40	+0.27	+0.36	. . .
43 Cassiopeiæ . .	1 33 6.560	−.032	−.133	. . .	+67 24 35.17	−0.69	−0.30	. . .	. . .
ν Piscium . . .	1 34 55.654	−.006	. . .	−.011	+ 4 51 15.98	−0.63	. . .	. . .	−0.59
ο Piscium . . .	1 38 47.646	+.014	. . .	+.022	+ 8 31 39.49	+0.43	. . .	+0.14	+0.17
β Arietis . . .	1 47 44.268	−.011	+.004	−.016	+20 11 45.72	+0.00	+0.27	+0.11	+0.07
50 Cassiopeiæ . .	1 52 47.974	+.015	. . .	. . .	+71 48 53.93	−0.34	. . .	+0.01	+0.01
γ Andromedæ .	1 56 13.980	+.013	−.038	. . .	+41 43 43.16	+0.33	+0.17	+0.28	. . .
α Arietis . . .	2 0 7.796	+.005	. . .	+.004	+22 52 13.38	−0.28	. . .	−0.28	−0.32
β Trianguli . .	2 2 6.625	+.028	. . .	. . .	+34 23 41.42	+0.08	. . .	+0.27	. . .
55 Cassiopeiæ . .	2 4 41.802	+.052	. . .	. . .	+65 56 11.37	+1.44	. . .	. . .	. . .

* After reduction to the system of Auwers.

NAME OF STAR.	Right Ascensions for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Newcomb *minus* H. C. O.	Declinations for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Boss *minus* H. C. O.	Newcomb *minus* H. C. O.
	h. m. s.	s.	s.	s	° ′ ″	″	″	″	″
6 Persei . . .	2 5 18.120	−.015	. . .	. . .	+50 29 1.74	−0.20	. . .	. . .	. . .
γ Trianguli . .	2 9 53.284	−.001	. . .	. . .	+33 16 4.01	+0.21	. . .	. . .	. . .
67 Ceti	2 10 44.996	−.025	. . .	. . .	− 6 59 58.57	+1.67	. . .	. . .	. . .
o Ceti	2 13 1.947	+.005	. . .	. . .	− 3 32 47.37	+0.02	. . .	. . .	. . .
ι Cassiopeiæ . .	2 18 47.572	+.056	. . .	. . .	+66 50 19.69	−0.44	. . .	−0.34	−0.33
ξ^2 Ceti	2 21 30.876	+.006	. . .	+.012	+ 7 53 54.68	+0.31	. . .	+.017	+0.18
36 H. Cassiopeiæ .	2 26 11.439	−.006	. . .	. . .	+72 16 9.62	+0.26	. . .	+.004	. . .
ν Arietis . . .	2 31 43.302	−.025	. . .	−.043	+21 25 10.63	+0.00	. . .	. . .	+0.45
δ Ceti	2 33 4.570	+.032	. . .	. . .	− 0 12 43.50	+0.14	. . .	. . .	. . .
Groom. 537 .	2 34 5.943	+.025	. . .	. . .	+67 17 29.23	+0.25	. . .	. . .	. . .
θ Persei . . .	2 35 40.260	+.024	. . .	. . .	+48 41 53.41	−0.21	. . .	−0.21	. . .
γ Ceti	2 36 49.516	−.019	. . .	−.036	+ 2 42 28.27	−0.45	. . .	−0.29	−0.23
41 Arietis . . .	2 42 37.765	+.009	. . .	. . .	+26 44 37.86	−0.06	. . .	−0.11	. . .
τ Persei . . .	2 45 24.357	−.008	. . .	. . .	+52 14 56.68	+0.21	. . .	+0.23	. . .
47 H. Cephei . .	2 49 33.603	+.123	. . .	. . .	+78 55 17.49	−0.17	. . .	−0.78	. . .
α Ceti	2 55 44.791	−.011	. . .	−.004	+ 3 35 53.44	−0.72	. . .	−0.73	−0.68
ϱ Persei . . .	2 57 10.307	−.011	. . .	. . .	+38 21 15.61	−0.40	. . .	−0.27	. . .
β Persei . . .	3 0 2.488	−.001	. . .	. . .	+40 28 20.36	−0.07	. . .	+0.06	. . .
δ Arietis . . .	3 4 29.030	−.012	. . .	−.017	+19 15 8.32	+0.09	. . .	. . .	+0.34
48 H. Cephei . .	3 4 32.137	−.013	. . .	. . .	+77 16 18.84	+0.44	. . .	+0.47	+0.45
α Persei . . .	3 15 24.432	+.000	. . .	+.010	+49 24 51.19	+0.23	. . .	+0.21	+0.31
o Tauri. . . .	3 18 5.288	+.002	. . .	. . .	+ 8 35 14.80	−0.17	. . .	−0.30	. . .
ξ Tauri. . . .	3 20 23.748	+.040	. . .	. . .	+ 9 17 42.99	−0.22	. . .	−0.01	. . .
f Tauri. . . .	3 23 58.403	+.013	. . .	−.004	+12 30 23.98	+0.02	. . .	. . .	+0.29
ε Eridani . . .	3 27 2.513	−.001	. . .	−.003	− 9 52 58.62	+0.13	. . .	. . .	−0.01
Groom. 716. .	3 31 19.525	+.031	. . .	. . .	+62 48 33.52	−1.30	. . .	. . .	. . .
δ Persei . . .	3 34 1.924	+.003	. . .	+.014	+47 23 8.41	+0.13	. . .	+0.04	+0.14
5 H. Camelopardi	3 37 11.738	−.020	. . .	. . .	+70 56 38.14	−0.08	. . .	. . .	. . .
η Tauri. . . .	3 40 3.388	+.005	. . .	−.016	+23 43 0.54	+0.03	. . .	−0.03	−0.08
ζ Persei . . .	3 46 16.690	−.008	. . .	−.021	+31 30 37.99	−0.34	. . .	−0.47	−0.46
9 H. Camelopardi	3 46 29.575	−.021	. . .	. . .	+60 44 23.26	+1.17	. . .	. . .	. . .
ε Persei . . .	3 49 28.212	−.008	. . .	. . .	+39 38 47.52	+0.01	. . .	. . .	. . .
λ Tauri. . . .	3 53 45.394	−.004	. . .	+.016	+12 8 7.21	−0.06	. . .	. . .	−0.04
Groom. 750 .	3 57 58.197	+.218	. . .	. . .	+85 13 19.82	+0.21	. . .	+0.58	. . .
c Persei . . .	3 59 35.605	−.049	. . .	. . .	+47 22 35.21	−0.20	. . .	−0.58	. . .
o^1 Eridani . . .	4 5 45.850	+.047	. . .	. . .	− 7 9 54.39	+0.00	. . .	. . .	. . .
γ Tauri. . . .	4 12 40.887	−.008	. . .	−.005	+15 19 25.67	+0.03	. . .	+0.38	+0.38
δ Tauri. . . .	4 15 43.668	−.014	. . .	+.001	+17 14 50.74	−0.08	. . .	. . .	+0.03
ε Tauri. . . .	4 21 19.156	−.007	. . .	−.020	+18 54 4.34	−0.21	. . .	−0.06	−0.06
1 Camelop. seq. .	4 22 8.196	−.010	. . .	. . .	+53 38 12.03	−0.59	. . .	. . .	. . .
α Tauri. . . .	4 28 44.937	+.011	. . .	+.022	+16 15 21.16	+0.36	. . .	+0.45	+0.45
ν Eridani . . .	4 30 4.439	−.020	. . .	. . .	− 3 36 34.76	−0.38	. . .	. . .	. . .
Groom. 848. .	4 32 2.968	−.003	. . .	. . .	+75 42 31.35	+1.43	. . .	. . .	. . .
τ Tauri. . . .	4 34 44.672	−.037	. . .	−.036	+22 42 54.37	−0.05	. . .	. . .	−0.23
4 Camelopardi .	4 37 35.836	+.000	. . .	. . .	+56 31 55.38	+0.65	. . .	+0.78	. . .

NAME OF STAR.	Right Ascensions for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Newcomb *minus* H. C. O.	Declinations for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Boss *minus* H. C. O.	Newcomb *minus* H. C. O.
	h. m. s.	s.	s.	s.	° ′ ″	″	″	″	″
μ Eridani . . .	4 39 15.155	+.004	. . .	. . .	− 3 29 7.84	−0.21	. . .	. . .	. . .
9 Camelopardi .	4 41 38.189	−.032	. . .	. . .	+66 7 37.48	−0.59	. . .	−0.67	−0.66
ι Aurigæ . . .	4 48 51.321	+.007	. . .	−.007	+32 57 57.15	−0.05	. . .	+0.09	+0.12
10 Camelopardi .	4 52 18.318	+.059	. . .	. . .	+60 15 22.23	+0.56	. . .	+0.72	. . .
ε Aurigæ . . .	4 53 0.127	−.018	. . .	. . .	+43 38 9.28	−0.21	. . .	−0.34	. . .
ζ Aurigæ . . .	4 53 44.605	−.009	. . .	. . .	+40 53 26.92	+0.43	. . .	+0.33	. . .
ι Tauri	4 55 37.512	+.001	. . .	+.001	+21 24 33.73	−0.35	. . .	. . .	−0.53
19 H. Camelop. .	5 1 59.791	−.079	. . .	. . .	+79 4 54.16	+0.00	. . .	. . .	. . .
λ Eridani . . .	5 3 9.881	+.013	. . .	. . .	− 8 54 58.51	+0.89	. . .	. . .	. . .
μ Aurigæ . . .	5 4 52.570	+.015	. . .	. . .	+38 20 2.25	−0.19	. . .	. . .	. . .
a Aurigæ . . .	5 7 27.430	+.003	. . .	+.000	+45 52 5.67	−0.29	. . .	−0.16	−0.06
β Orionis . . .	5 8 31.846	+.010	. . .	+.014	− 8 20 52.42	+0.06	. . .	+0.13	+0.11
τ Orionis . . .	5 11 32.250	−.029	. . .	. . .	− 6 58 52.50	−0.37	. . .	. . .	. . .
β Tauri	5 18 23.464	−.004	. . .	−.003	+28 29 58.60	−0.13	. . .	−0.15	−0.17
Groom. 966 .	5 23 1.184	+.129	. . .	. . .	+74 57 22.15	+0.22	. . .	+0.37	+0.35
δ Orionis . . .	5 25 37.218	+.027	. . .	+.037	− 0 23 37.07	+0.06	. . .	+0.16	+0.22
ε Orionis . . .	5 29 52.267	−.022	. . .	−.013	− 1 17 1.90	+0.86	. . .	+0.75	+0.81
σ Orionis . . .	5 32 28.279	−.018	. . .	. . .	− 2 40 27.33	+0.42	. . .	. . .	. . .
o Aurigæ . . .	5 36 13.075	+.003	. . .	. . .	+49 46 7.42	−0.03	. . .	. . .	. . .
ν Aurigæ . . .	5 42 49.627	−.025	. . .	. . .	+39 6 33.19	+0.02	. . .	+0.29	. . .
α Orionis . . .	5 48 24.269	+.004	. . .	+.007	+ 7 22 54.71	−0.41	. . .	−0.55	−0.50
β Aurigæ . . .	5 50 21.619	−.007	. . .	. . .	+44 55 55.22	+0.19	. . .	+0.35	. . .
θ Aurigæ . . .	5 51 11.877	+.010	. . .	. . .	+37 12 5.08	−0.03	. . .	−0.21	. . .
36 Camelopardi .	6 0 16.531	−.100	. . .	. . .	+65 44 22.06	+0.03	. . .	. . .	. . .
ν Orionis . . .	6 0 26.113	−.004	. . .	+.018	+14 46 52.51	+0.22	. . .	. . .	+0.05
22 H. Camelop. .	6 5 4.225	−.089	. . .	. . .	+69 21 35.80	−0.35	. . .	−0.63	−0.62
η Geminorum. .	6 7 19.939	+.004	. . .	+.015	+22 32 27.46	−0.33	. . .	−0.35	−0.38
23 H.Camelop. .	6 24 51.798	+.025	. . .	. . .	+79 41 37.27	−0.75	. . .	. . .	. . .
γ Geminorum .	6 30 29.448	−.013	. . .	−.022	+16 30 13.31	+0.55	. . .	+0.63	+0.61
51 H. Cephei . .	6 41 14.952	+.407	. . .	. . .	+87 14 5.08	−0.45	. . .	−0.63	−0.59
θ Geminorum .	6 44 32.957	+.005	. . .	. . .	+34 6 34.30	+0.48	. . .	+0.14	. . .
15 Lyncis . . .	6 46 26.850	+.008	. . .	. . .	+58 35 0.55	+0.12	. . .	. . .	. . .
ζ Geminorum .	6 56 41.675	−.010	. . .	+.003	+20 45 5.76	+0.04	. . .	−0.11	−0.19
63 Aurigæ . . .	7 3 3.299	+.017	. . .	. . .	+39 31 19.29	+0.25	. . .	. . .	. . .
64 Aurigæ . . .	7 9 20.549	+.004	. . .	. . .	+41 6 10.31	+0.09	. . .	. . .	. . .
λ Geminorum .	7 10 54.503	+.007	. . .	+.026	+16 45 50.06	+0.08	. . .	−0.10	−0.26
δ Geminorum. .	7 12 39.406	−.027	. . .	−.016	+22 12 37.26	+0.44	. . .	+0.27	+0.22
Groom. 1308 .	7 17 51.285	+.046	. . .	. . .	+68 43 3.14	−0.35	. . .	+0.05	+0.06
ι Geminorum .	7 17 57.687	−.007	. . .	−.011	+28 2 40.00	−0.20	. . .	−0.08	−0.25
β Canis Minoris .	7 20 22.269	+.013	. . .	. . .	+ 8 32 21.40	+0.44	. . .	+0.09	. . .
ϱ Geminorum .	7 21 4.164	−.009	. . .	+.019	+32 1 51.39	−0.12	. . .	. . .	. . .
α^1 Geminorum .	7 26 36.904	+.200	. . .	. . .	+32 9 36.11	. . .	. . .	. . .	. . .
α^2 Geminorum .	7 26 37.317	−.213	. . .	+.019	+32 9 37.14	+0.17	. . .	+0.72	−0.73
α Canis Minoris .	7 32 45.392	+.010	. . .	−.001	+ 5 32 37.68	−0.37	. . .	. . .	−0.62
β Geminorum .	7 37 39.886	+.003	. . .	+.004	+28 19 34.21	−0.01	. . .	−0.05	−0.07

NAME OF STAR.	Right Ascensions for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Newcomb *minus* H. C. O.	Declinations for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Boss *minus* H. C. O.	Newcomb *minus* H. C. O.
	h. m. s.	s.	s.	s.	° ′ ″	″	″	″	″
Groom. 1374 .	7 45 11.562	−.047	. . .	. . .	+74 14 52.12	+0.52	. . .	. . .	. . .
Groom. 1408 .	8 3 46.938	−.012	. . .	. . .	+76 8 4.22	+0.63	. . .	. . .	. . .
β Cancri . . .	8 9 44.097	+.016	. . .	. . .	+ 9 34 8.75	+0.13	. . .	+0.14	. . .
o Ursæ Majoris .	8 19 51.834	−.044	. . .	. . .	+61 8 1.39	−0.20	. . .	−0.53	. . .
η Cancri . . .	8 25 28.689	+.010	. . .	+.014	+20 51 51.05	+0.11	. . .	. . .	−0.07
Groom. 1446 .	8 25 45.577	−.007	. . .	. . .	+74 3 49.13	−0.88	. . .	. . .	. . .
δ Cancri . . .	8 37 34.777	−.014	. . .	−.023	+18 36 43.56	+0.57	. . .	+0.47	+0.33
ε Hydræ . . .	8 40 9.326	−.006	. . .	+.002	+ 6 52 33.75	−0.28	. . .	+0.66	−0.30
57 Cancri. med. .	8 46 36.867	+.004	. . .	. . .	+31 3 4.97	−0.71	. . .	. . .	. . .
ζ Hydræ . . .	8 48 47.088	+.025	. . .	. . .	+ 6 25 12.21	−0.50	. . .	. . .	. . .
ι Ursæ Majoris .	8 50 38.493	−.017	. . .	−.077	+48 31 50.65	+0.25	. . .	+0.19	+0.29
κ Ursæ Majoris .	8 55 4.972	+.042	. . .	. . .	+47 38 56.81	+0.15	. . .	+0.20	. . .
σ^2 Ursæ Majoris .	8 59 22.072	−.016	. . .	. . .	+67 38 23.34	−0.08	. . .	+0.08	+0.08
υ Hydræ . . .	9 7 51.593	+.009	. . .	. . .	+ 2 50 25.60	−0.20	. . .	. . .	. . .
38 Lyncis . . .	9 11 3.646	−.011	. . .	. . .	+37 19 48.21	+0.08	. . .	. . .	. . .
83 Cancri . . .	9 12 0.164	+.010	. . .	+.002	+18 14 1.96	+0.34	. . .	. . .	−0.01
40 Lyncis . . .	9 13 26.138	−.021	. . .	. . .	+34 55 10.57	+0.27	. . .	+0.41	. . .
1 H. Draconis .	9 19 5.932	−.192	. . .	. . .	+81 52 33.02	−0.13	. . .	−0.07	−0.09
α Hydræ . . .	9 21 26.670	+.018	. . .	+.015	− 8 7 4.43	−0.02	. . .	−0.20	−0.21
d Ursæ Majoris .	9 23 23.723	−.018	. . .	. . .	+70 22 40.32	+0.29	. . .	+0.03	+0.03
Groom. 1564 .	9 31 30.803	+.023	. . .	. . .	+69 48 17.46	−0.65	. . .	. . .	. . .
o Leonis . . .	9 34 28.678	+.007	. . .	−.014	+10 27 35.72	−0.17	. . .	+0.00	−0.25
ε Leonis . . .	9 38 45.196	−.005	. . .	−.012	+24 20 55.12	+0.26	. . .	+0.24	+0.19
v Ursæ Majoris .	9 42 5.127	+.003	. . .	. . .	+59 37 31.55	+0.04	. . .	−0.33	. . .
μ Leonis . . .	9 45 39.081	+.007	. . .	+.004	+26 35 40.89	−0.44	. . .	−0.32	−0.35
Groom. 1586 .	9 47 9.765	−.050	. . .	. . .	+73 28 20.32	+0.21	. . .	. . .	. . .
π Leonis . . .	9 53 36.405	+.004	. . .	−.005	+ 8 38 35.41	−0.69	. . .	. . .	−0.73
η Leonis . . .	10 0 30.942	+.054	. . .	+.023	+17 22 16.49	+0.02	. . .	+0.03	+0.29
α Leonis . . .	10 1 42.818	−.018	. . .	−.012	+12 34 37.79	+0.28	. . .	+0.28	+0.19
λ Ursæ Majoris .	10 9 33.083	+.000	. . .	. . .	+43 32 15.46	−0.06	. . .	+0.13	. . .
μ Ursæ Majoris .	10 14 52.567	−.003	. . .	. . .	+42 7 37.91	+0.27	. . .	+0.25	. . .
31 Leonis Minoris	10 20 39.023	−.009	. . .	. . .	+37 20 49.09	−0.09	. . .	. . .	. . .
9 H. Draconis .	10 24 24.847	−.052	. . .	. . .	+76 21 21.29	−0.38	. . .	−0.45	−0.46
ϱ Leonis . . .	10 26 13.699	+.003	. . .	+.009	+ 9 56 56.58	+0.32	. . .	+0.10	+0.11
35 H. Ursæ Majoris	10 34 5.381	−.008	. . .	. . .	+69 43 44.91	+0.04	. . .	. . .	. . .
42 Leonis Minoris	10 38 54.647	−.026	. . .	. . .	+31 20 24.79	−0.36	. . .	. . .	. . .
ι Leonis . . .	10 42 41.158	+.001	. . .	−.004	+11 12 21.35	+0.32	. . .	+0.34	+0.35
Br. 1508. . .	10 49 53.400	+.076	. . .	. . .	+78 26 20.43	+0.54	. . .	. . .	. . .
α Ursæ Majoris .	10 55 59.864	+.014	. . .	. . .	+62 25 30.97	+0.44	. . .	+0.40	+0.43
χ Leonis . . .	10 58 34.105	−.001	. . .	−.001	+ 8 0 40.73	−0.04	. . .	. . .	−0.21
ψ Ursæ Majoris .	11 2 37.779	−.006	. . .	. . .	+45 10 34.38	+0.16	. . .	+0.10	. . .
δ Leonis . . .	11 7 27.512	+.001	. . .	−.001	+21 12 29.68	−0.06	. . .	−0.17	−0.21
ξ Ursæ Maj. med.	11 11 30.709	−.044	. . .	. . .	+32 13 55.45	+0.03	. . .	. . .	. . .
σ Leonis . . .	11 14 41.417	+.016	. . .	+.018	+ 6 42 50.86	−0.40	. . .	. . .	−0.34
Groom. 1771 .	11 15 24.611	+.012	. . .	. . .	+65 0 50.76	+0.51	. . .	. . .	. . .

NAME OF STAR.	Right Ascensions for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Newcomb *minus* H. C. O.	Declinations for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Boss *minus* H. C. O.	Newcomb *minus* H. C. O.
	h. m. s.	s.	s.	s.	° ′ ″	″	″	″	″
λ Draconis . .	11 23 57.701	+.023	. . .	. . .	+70 1 15.42	−0.57	. . .	−0.69	−0.69
v Leonis . . .	11 30 32.918	+.009	. . .	+.008	− 0 8 2.48	+0.80	. . .	+0.55	+0.62
3 Draconis . .	11 35 29.052	+.031	. . .	. . .	+67 26 11.51	+0.52	. . .	. . .	. . .
χ Ursæ Majoris .	11 39 26.630	−.020	. . .	. . .	+48 28 20.65	+0.04	. . .	−0.01	. . .
β Leonis . . .	11 42 40.965	−.007	. . .	−.006	+15 16 14.77	−0.27	. . .	−0.32	−0.33
β Virginis . . .	11 44 11.044	−.019	. . .	−.015	+ 2 28 8.77	−0.35	. . .	−0.56	−1.09
γ Ursæ Majoris .	11 47 14.868	−.016	. . .	+.019	+54 23 23.32	−0.34	. . .	−0.46	−0.39
o Virginis . . .	11 58 50.470	+.027	. . .	−.002	+ 9 25 38.18	+0.03	. . .	+0.01	+0.02
Groom. 1852 .	11 58 52.145	−.048	. . .	. . .	+77 36 17.38	+0.44	. . .	. . .	. . .
4 H. Draconis .	12 6 19.150	−.059	. . .	. . .	+78 18 40.31	−0.61	. . .	−0.85	−0.87
η Virginis . . .	12 13 30.666	−.003	. . .	+.000	+ 0 1 40.23	+0.29	. . .	+0.32	+0.39
κ Draconis. . .	12 28 8.214	−.035	. . .	. . .	+70 28 39.42	−0.40	. . .	−0.47	−0.47
γ Virginis . . .	12 35 19.567	+.059	. . .	+.066	− 0 45 48.60	−0.44	. . .	. . .	−0.67
ε Ursæ Majoris .	12 48 31.498	−.027	−.016	. . .	+56 38 19.03	−0.09	−0.43	−0.23	. . .
12 Canum. Ven. seq.	12 50 10.710	−.001	−.010	−.004	+38 59 39.21	−1.36	−1.30	−1.54	−1.44
8 Draconis . .	12 50 29.640	−.020	−.057	. . .	+66 7 1.40	−0.32	−0.43	. . .	. . .
ε Virginis . . .	12 55 57.266	+.009	+.028	. . .	+11 37 53.04	+0.00	−0.12	. . .	. . .
θ Virginis . . .	13 3 28.750	−.013	. . .	−.014	− 4 52 15.90	−0.02	. . .	−0.45	+0.04
43 Comæ . . .	13 6 2.339	+.017	+.001	. . .	+28 30 44.10	−0.12	−0.26	−0.06	. . .
ζ Ursæ Majoris pr.	13 18 53.390	−.033	+.026	. . .	+55 34 43.13	+0.07	−0.16	−0.10	. . .
Groom. 2001 .	13 22 56.909	+.055	. . .	. . .	+73 2 26.95	+0.81	. . .	+0.99	. . .
ζ Virginis . . .	13 28 19.475	+.001	. . .	+.003	+ 0 2 37.52	+0.48	. . .	+0.31	+0.39
Groom. 2029 .	13 34 11.050	−.054	. . .	. . .	+71 52 42.74	+0.53	. . .	. . .	. . .
η Ursæ Majoris .	13 42 36.813	+.013	+.023	+.013	+49 56 15.90	+0.11	+0.20	−0.12	−0.03
10 ι Draconis . .	13 47 46.880	+.028	+.089	. . .	+65 20 29.34	−0.84	−0.88	. . .	. . .
η Bootis . . .	13 48 43.963	+.019	+.017	+.020	+19 1 30.28	+0.14	−0.10	+0.01	−0.02
τ Virginis . . .	13 55 17.147	+.000	. . .	. . .	+ 2 9 1.05	−0.44	. . .	. . .	. . .
α Draconis . .	14 1 0.377	−.024	−.006	. . .	+64 58 25.99	−0.23	−0.23	−0.58	−0.57
d Bootis . . .	14 4 41.899	−.014	−.004	. . .	+25 41 4.74	+0.02	−0.21	+0.06	. . .
4 Ursæ Minoris .	14 9 21.996	+.038	. . .	. . .	+78 8 7.23	−1.55	. . .	. . .	. . .
α Bootis . . .	14 9 57.622	+.007	+.000	+.008	+19 50 2.19	+0.41	+0.60	+0.28	+0.25
θ Bootis . . .	14 20 56.495	−.008	+.022	+.019	+52 25 45.09	+0.14	+0.08	+0.04	+0.10
ϱ Bootis . . .	14 26 26.580	−.005	−.013	+.022	+30 55 15.95	−0.37	−0.31	−0.46	−0.34
γ Bootis . . .	14 27 2.672	−.011	+.033	. . .	+38 51 21.19	−0.23	−0.38	−0.13	. . .
π Bootis pr. . .	14 34 51.119	+.003	−.053	. . .	+16 57 18.71	−0.19	−0.15	. . .	. . .
ζ Bootis med. .	14 35 10.829	−.031	−.018	. . .	+14 15 55.82	+0.22	+0.01	. . .	. . .
109 Virginis . . .	14 39 55.821	−.004	. . .	. . .	+ 2 25 13.49	+1.31	. . .	. . .	. . .
Groom. 2164 .	14 48 16.196	−.087	−.117	. . .	+59 48 9.33	+0.07	+0.62	+0.39	. . .
β Ursæ Minoris .	14 51 5.463	−.042	. . .	. . .	+74 39 58.64	+0.26	. . .	+0.29	+0.28
2 H. Ursæ Minoris	14 55 36.145	−.018	+.034	. . .	+66 25 50.71	+0.25	+0.26	. . .	. . .
β Bootis . . .	14 57 14.275	−.001	−.015	−.006	+40 53 4.37	+0.03	+0.15	−0.16	−0.07
ψ Bootis . . .	14 59 5.372	+.012	+.016	. . .	+27 26 9.64	+0.19	+0.10	. . .	. . .
β Libræ . . .	15 10 16.923	+.018	. . .	+.015	− 8 55 13.12	−0.05	. . .	−0.22	−0.24
δ Bootis . . .	15 10 27.825	−.002	+.036	. . .	+33 46 55.11	+0.93	+1.05	. . .	. . .
1 H. Ursæ Minoris	15 13 12.671	−.054	−.028	. . .	+67 49 18.26	−0.13	+0.21	. . .	. . .

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	h. m. s.	s.	s.	s.	° ′ ″	″	″	″	″
γ Ursæ Minoris .	15 20 56.525	+.035	. . .	. . .	+72 16 43.69	+0.09	. . .	+0.04	+0.03
β Coronæ . . .	15 22 40.548	+.009	+.000	. . .	+29 32 15.80	−0.34	−0.46	−0.50	. . .
ν Bootis pr. .	15 26 26.389	+.018	−.007	. . .	+41 15 36.32	+0.04	−0.39	+0.25	. . .
ν Bootis seq. . .	15 27 18.530	−.004	−.068	. . .	+41 19 28.12	+0.06	−0.39	+0.14	. . .
α Coronæ . . .	15 29 23.760	−.001	−.009	+.014	+27 8 11.61	−0.08	−0.17	−0.10	−0.13
α Serpentis . .	15 38 6.693	+.018	. . .	+.020	+ 6 49 12.71	+0.02	. . .	−0.02	+0.03
β Serpentis .	15 40 25.143	−.005	+.027	. . .	+15 48 52.48	−0.71	−0.73	−0.64	. . .
μ Serpentis . .	15 43 5.840	+.034	. . .	. . .	− 3 2 46.29	+0.07	. . .	. . .	. . .
ε Serpentis . .	15 44 35.128	+.015	. . .	+.034	+ 4 51 18.37	+0.95	. . .	+1.07	+1.14
ζ Ursæ Minoris .	15 48 33.866	−.078	. . .	. . .	+78 10 40.64	+0.26	. . .	+0.25	+0.23
γ Serpentis . .	15 50 40.791	−.036	+.018	. . .	+16 4 15.85	−0.43	−0.20	. . .	. . .
Groom. 2296 .	15 54 49.547	+.018	−.047	. . .	+55 6 12.94	−0.05	−0.08	+0.12	. . .
θ Draconis . .	15 59 32.928	+.093	+.040	. . .	+58 53 58.71	−0.01	+0.13	−0.06	. . .
δ Ophiuchi . .	16 7 47.778	−.008	. . .	−.007	− 3 22 15.05	−0.10	. . .	−0.16	−0.14
ε Ophiuchi . .	16 11 42.519	−.006	. . .	. . .	− 4 23 9.94	−0.61	. . .	. . .	. . .
19 Ursæ Minoris .	16 14 24.796	−.027	. . .	. . .	+76 11 29.15	−0.14	. . .	. . .	. . .
γ Herculis . . .	16 16 24.387	−.011	−.008	. . .	+19 26 52.53	+0.30	+0.35	+0.67	. . .
ω Herculis . . .	16 19 38.875	−.012	−.030	. . .	+14 19 20.76	+0.06	+0.67	. . .	. . .
η Draconis . .	16 22 18.077	+.141	+.120	. . .	+61 47 50.90	+0.09	+0.16	+0.27	+0.30
λ Ophiuchi . .	16 24 36.598	−.008	. . .	. . .	+ 2 15 32.40	+0.04	. . .	+0.06	. . .
A Draconis . .	16 28 14.132	−.056	−.038	. . .	+69 2 18.79	+0.06	−0.12	−0.41	−0.39
Groom. 2373 .	16 36 2.923	−.053	. . .	. . .	+77 41 37.95	+0.23	. . .	. . .	. . .
ζ Herculis . .	16 36 34.482	+.015	+.061	. . .	+31 49 49.46	−0.08	−0.19	−0.02	. . .
η Herculis . .	16 38 36.681	+.020	+.029	−.026	+39 9 39.75	+0.26	+0.06	+0.11	+0.17
Groom. 2377 .	16 42 55.637	+.093	+.075	. . .	+57 0 21.30	−0.33	−0.29	−0.28	. . .
49 Herculis . . .	16 46 23.436	+.009	−.018	. . .	+15 11 8.14	−0.44	−0.60	. . .	. . .
$\varkappa$ Ophiuchi . .	16 51 45.127	−.004	. . .	+.016	+ 9 34 15.05	+0.15	. . .	+0.21	+0.23
ε Herculis . . .	16 55 30.467	−.002	+.007	. . .	+31 6 41.99	−0.04	−0.05	+0.15	. . .
ε Ursæ Minoris .	16 58 50.789	+.021	. . .	. . .	+82 14 22.45	+0.26	. . .	+0.16	+0.14
Groom. 2415 .	17 3 42.190	−.047	−.057	. . .	+40 40 49.69	−0.29	−0.07	. . .	. . .
α Herculis . . .	17 8 56.918	−.018	−.016	−.016	+14 32 3.35	−0.04	+0.29	+0.23	+0.23
π Herculis . . .	17 10 41.657	−.013	+.031	. . .	+36 57 4.10	−0.28	−0.21	−0.50	. . .
β Draconis . .	17 27 36.553	+.019	+.016	+.017	+52 23 40.69	+0.10	+0.28	−0.12	−0.05
α Ophiuchi . .	17 29 7.953	+.002	+.002	+.003	+12 39 9.37	−0.19	+0.16	−0.12	−0.11
f Draconis . .	17 32 27.990	+.002	−.003	. . .	+68 12 52.26	−0.14	−0.09	. . .	. . .
ω Draconis . .	17 37 41.045	+.068	+.053	. . .	+68 48 55.68	+0.10	+0.09	+0.15	+0.16
μ Herculis . . .	17 41 34.009	+.037	+.022	+.034	+27 47 41.71	+0.36	+0.43	+0.42	+0.40
ψ Drac. Aust. .	17 44 9.890	+.007	. . .	. . .	+72 12 34.52	−0.02	. . .	−0.17	−0.17
γ Draconis . .	17 53 42.247	−.003	+.056	−.008	+51 30 15.34	+0.05	+0.30	. . .	+0.17
35 Draconis . .	17 55 2.807	+.023	. . .	. . .	+76 58 39.71	+0.32	. . .	+0.66	. . .
o Herculis . . .	18 2 40.039	−.012	−.027	. . .	+28 44 47.71	+0.06	−0.37	−0.22	. . .
δ Ursæ Minoris .	18 12 39.224	+.039	. . .	. . .	+86 36 27.43	+0.29	. . .	+0.28	+0.25
η Serpentis . .	18 14 50.542	−.014	. . .	−.005	− 2 55 46.15	+0.05	. . .	+0.40	+0.43
109 Herculis . . .	18 18 22.297	+.011	−.031	. . .	+21 42 51.61	−0.20	−0.10	. . .	. . .
b Draconis . .	18 22 4.979	+.099	+.062	. . .	+58 43 42.76	+0.55	+1.07	+0.85	. . .

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	h. m. s.	s.	s.	s.	° ′ ″	″	″	″	″
φ Draconis . .	18 22 32.856	+.052	. . .	. . .	+71 16 15.31	−0.21	. . .	. . .	. . .
χ Draconis . .	18 23 18.569	−.027	. . .	. . .	+72 40 41.10	−0.06	. . .	−0.04	. . .
α Lyræ	18 32 42.392	+.003	+.000	−.002	+38 40 6.67	−0.30	−0.26	−0.56	−0.50
Groom. 2655 .	18 35 46.483	+.125	. . .	. . .	+77 26 52.30	−0.59	. . .	. . .	. . .
110 Herculis . .	18 40 16.926	+.033	+.076	. . .	+20 25 41.22	−0.31	−0.62	−0.14	. . .
β Lyræ	18 45 27.840	+.086	+.053	+.079	+33 13 6.83	+0.65	+0.82	+0.34	+0.36
13 R. Lyræ . . .	18 51 31.927	−.026	−.032	. . .	+43 46 56.67	−0.22	−0.43	. . .	. . .
ε Aquilæ . . .	18 53 56.953	+.029	+.018	. . .	+14 53 59.96	−0.03	−0.12	+0.02	. . .
ζ Aquilæ . . .	18 59 39.911	−.011	−.039	−.005	+13 40 44.47	+0.18	+0.16	+0.35	+0.36
ω Aquilæ . . .	19 11 56.967	−.004	+.010	. . .	+11 22 16.60	+0.56	+0.72	. . .	. . .
δ Draconis . .	19 12 31.335	−.046	−.007	. . .	+67 26 29.63	+0.41	+0.74	+0.51	+0.51
ϰ Cygni . . .	19 14 12.809	+.018	−.038	. . .	+53 8 19.00	−0.40	−0.40	−0.54	. . .
τ Draconis . .	19 17 56.730	+.002	. . .	. . .	+73 7 21.71	+0.54	. . .	+0.46	+0.53
δ Aquilæ . . .	19 19 11.757	−.006	. . .	−.016	+ 2 52 2.56	−1.05	. . .	−0.95	−0.89
β Cygni . . .	19 25 40.851	−.007	−.011	. . .	+27 41 54.35	−0.42	−0.21	−0.13	. . .
Groom. 2900 .	19 29 13.082	−.156	. . .	. . .	+79 21 0.90	+0.21	. . .	. . .	. . .
γ Aquilæ . . .	19 40 19.016	+.000	+.011	+.004	+10 18 36.11	−0.04	−0.10	+0.01	+0.01
δ Sagittæ . . .	19 41 48.870	−.023	+.110	. . .	+18 13 37.28	+0.68	+1.19	. . .	. . .
α Aquilæ . . .	19 44 41.054	+.007	. . .	+.011	+ 8 32 22.82	−0.27	. . .	−0.25	−0.23
η Aquilæ . . .	19 46 6.300	−.012	. . .	. . .	+ 0 41 9.98	+0.69	. . .	. . .	. . .
ε Draconis . .	19 48 35.280	−.046	−.049	. . .	+69 56 58.27	+0.01	+0.20	+0.21	+0.20
β Aquilæ . . .	19 49 10.392	−.009	. . .	−.005	+ 6 5 45.62	−0.19	. . .	−0.35	−0.29
λ Ursæ Minoris .	19 49 16.178	+.635	. . .	. . .	+88 55 51.86	−0.37	. . .	−0.24	−0.28
θ Aquilæ . . .	20 4 51.302	−.023	. . .	. . .	− 1 11 27.03	−0.10	. . .	. . .	. . .
ϰ Cephei . . .	20 13 3.809	−.036	. . .	. . .	+77 20 2.38	−0.15	. . .	+0.17	+0.15
γ Cygni . . .	20 17 44.553	+.029	−.004	+.073	+39 51 27.32	−0.40	−0.30	−0.53	−0.50
ε Delphini . . .	20 27 14.456	+.012	−.011	+.021	+10 52 46.35	+0.24	+0.37	+0.63	+0.63
β Delphini . .	20 31 41.232	+.014	−.030	. . .	+14 9 40.87	+0.26	+0.46	+0.01	. . .
73 Draconis . .	20 33 7.956	+.116	. . .	. . .	+74 31 33.11	−0.05	. . .	. . .	. . .
α Delphini . . .	20 33 49.954	−.025	−.016	. . .	+15 28 19.98	−0.03	+0.16	+0.14	. . .
α Cygni . . .	20 37 10.278	+.005	+.027	−.008	+44 50 3.74	+0.25	+0.55	+0.18	+0.27
ε Cygni . . .	20 41 9.233	+.022	+.035	. . .	+33 30 10.06	+0.47	+0.70	+0.34	. . .
η Cephei . . .	20 42 44.656	+.015	+.055	. . .	+61 21 13.29	−0.01	+0.07	+0.16	. . .
32 Vulpeculæ . .	20 49 14.003	+.013	+.001	. . .	+27 34 58.81	+0.36	+0.53	. . .	. . .
76 Draconis . .	20 51 30.604	+.075	. . .	. . .	+82 4 0.44	−0.77	. . .	. . .	. . .
ν Cygni . . .	20 52 30.864	−.022	+.008	−.045	+40 41 11.08	+1.01	+1.14	+1.06	+1.14
Br. 2749 . .	20 53 11.574	−.022	. . .	. . .	+80 4 56.69	−0.17	. . .	−0.26	−0.28
61 Cygni pr. . .	21 1 17.727	−.041	−.028	−.015	+38 8 8.60	−0.22	+0.00	−0.18	−0.12
ζ Cygni . . .	21 7 37.046	−.034	+.007	−.046	+29 42 54.91	−0.63	−0.70	−0.73	−0.73
77 Draconis . .	21 7 57.570	−.011	. . .	. . .	+77 37 8.12	+0.06	. . .	. . .	. . .
τ Cygni . . .	21 9 48.153	−.009	−.003	. . .	+37 30 45.33	−0.15	+0.36	+0.19	. . .
α Cephei . . .	21 15 35.688	+.020	+.042	. . .	+62 3 23.08	−0.22	−0.22	−0.02	+0.01
β Aquarii . . .	21 24 58.685	−.021	. . .	−.023	− 6 7 10.83	−1.54	. . .	−1.49	−1.53
β Cephei . . .	21 27 2.444	+.013	−.068	. . .	+70 0 43.95	+0.02	−0.18	−0.04	−0.04
ε Pegasi . . .	21 38 2.801	+.014	. . .	+.018	+ 9 18 10.05	−0.15	. . .	−0.09	−0.07

NAME OF STAR.	Right Ascensions for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Newcomb *minus* H. C. O.	Declinations for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Boss *minus* H. C. O.	Newcomb *minus* H. C. O.
	h. m. s.	s.	s.	s.	° ′ ″	″	″	″	″
11 Cephei . . .	21 40 5.015	+.018	. . .	. . .	+70 44 10.41	−0.14	. . .	−0.26	−0.27
π^2 Cygni . . .	21 42 10.618	−.003	−.013	. . .	+48 43 55.08	−0.77	−0.83	. . .	. . .
16 Pegasi . . .	21 47 22.554	−.014	−.028	. . .	+25 20 16.00	−0.25	−0.37	−0.33	. . .
α Aquarii . . .	21 59 21.787	+.007	. . .	+.007	− 0 55 35.66	+0.78	. . .	+0.76	+0.83
ι Pegasi . . .	22 1 11.580	+.000	−.006	. . .	+24 44 6.35	+0.35	+0.58	+0.45	. . .
θ Pegasi . . .	22 3 53.663	+.006	. . .	. . .	+ 5 35 1.45	−0.63	. . .	. . .	. . .
ζ Cephei . . .	22 6 31.177	−.011	−.026	. . .	+57 35 7.94	+0.04	+0.18	+0.02	. . .
24 Cephei . . .	22 7 24.018	+.010	. . .	. . .	+71 43 32.89	−0.19	. . .	. . .	. . .
θ Aquarii . . .	22 10 14.195	+.033	. . .	+.009	− 8 24 18.28	+0.35	. . .	+0.15	+0.13
γ Aquarii . . .	22 15 11.969	+.004	. . .	. . .	− 2 1 59.97	+0.28	. . .	+0.51	. . .
3 Lacertæ . . .	22 18 38.856	−.023	−.018	. . .	+51 36 11.68	−0.01	+0.06	. . .	. . .
7 Lacertæ . . .	22 26 8.684	−.011	+.014	. . .	+49 38 25.37	−0.46	−0.38	−0.34	. . .
η Aquarii . . .	22 28 55.965	+.006	. . .	+.001	− 0 45 40.96	+0.44	. . .	+0.54	+0.61
31 Cephei . . .	22 32 40.788	+.077	. . .	. . .	+72 59 40.33	+0.15	. . .	. . .	. . .
ξ Pegasi . . .	22 35 13.683	+.018	−.003	+.017	+10 10 45.28	+0.11	+0.23	+0.30	+0.30
η Pegasi . . .	22 37 8.684	+.001	+.002	. . .	+29 34 4.92	−0.34	−0.38	−0.53	. . .
13 Lacertæ . . .	22 38 31.173	−.001	+.014	. . .	+41 9 48.56	+0.08	+0.26	. . .	. . .
λ Pegasi . . .	22 40 30.709	−.006	−.033	. . .	+22 54 29.82	+0.03	−0.10	−0.15	. . .
μ Pegasi . . .	22 43 58.291	+.011	−.015	. . .	+23 56 30.86	+0.10	+0.17	+0.20	. . .
ι Cephei . . .	22 45 14.069	+.026	+.031	. . .	+65 32 35.76	−0.14	−0.49	−0.09	−0.09
λ Aquarii . . .	22 46 5.560	−.015	. . .	+.010	− 8 14 39.89	+0.15	. . .	+0.47	+0.44
o Andromedæ .	22 56 10.396	−.004	−.006	. . .	+41 39 15.49	+0.61	+0.54	+0.23	. . .
α Pegasi . . .	22 58 32.139	−.023	−.032	−.017	+14 31 59.06	−0.12	−0.42	−0.23	−0.24
π Cephei . . .	23 3 55.647	−.047	. . .	. . .	+74 42 42.33	+0.62	. . .	. . .	. . .
γ Piscium . . .	23 10 41.157	−.036	. . .	+.333	+ 2 35 58.74	−0.38	. . .	. . .	−0.52
τ Pegasi . . .	23 14 27.114	−.001	+.013	. . .	+23 3 22.78	−0.17	−0.16	. . .	. . .
v Pegasi . . .	23 19 8.428	+.096	+.129	. . .	+22 42 58.14	−0.17	−0.32	. . .	. . .
λ Andromedæ .	23 31 27.068	+.029	+.035	. . .	+45 46 50.86	+0.53	+0.34	+0.96	. . .
ι Piscium . . .	23 33 31.311	−.021	. . .	−.022	+ 4 56 56.72	−0.93	. . .	−0.71	−0.66
γ Cephei . . .	23 34 14.013	−.013	. . .	. . .	+76 56 4.98	−0.13	. . .	+0.01	−0.01
41 H. Cephei . .	23 41 56.777	−.065	−.075	. . .	+67 6 44.11	+0.38	+0.36	+0.14	. . .
φ Pegasi . . .	23 46 7.827	+.013	+.009	. . .	+18 25 33.62	+0.04	+0.36	. . .	. . .
ϱ Cassiopeiæ . .	23 48 8.799	+.013	+.049	. . .	+56 48 13.48	+0.20	+0.52	. . .	. . .
ω Piscium . . .	23 52 53.570	+.013	. . .	+0.24	+ 6 10 16.65	−0.19	. . .	−0.36	−0.31

CATALOGUE OF 284 SECONDARY STARS

OBSERVED DURING THE YEARS 1871, 1872, 1874, AND 1875,

WITH THE

MERIDIAN CIRCLE OF HARVARD COLLEGE OBSERVATORY,

AND REDUCED TO THE FUNDAMENTAL SYSTEM OF AUWERS,

FOR THE EPOCH 1875.0.

NAME OF STAR.	Right Ascensions for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Newcomb *minus* H. C. O.	Declinations for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Boss *minus* H. C. O.	Newcomb *minus* H. C. O.
	h. m. s.	s.	s.	s.	° ′ ″	″	″	″	″
35 Piscium . . .	0 8 32.602	. . .	. . .	. . .	+ 8 7 36.19	. . .	. . .	. . .	. . .
θ Andromedæ .	0 10 33.981	. . .	−.092	. . .	+37 59 15.20	. . .	−0.10	. . .	. . .
ι Sculptoris . .	0 15 14.179	. . .	. . .	. . .	−29 40 22.29	. . .	. . .	. . .	. . .
12 Cassiopeiæ . .	0 17 54.521	. . .	+.024	. . .	+61 8 17.10	. . .	+0.36	. . .	. . .
Piazzi 0.79 . .	0 21 43.601	. . .	. . .	. . .	−33 41 51.53	. . .	. . .	. . .	. . .
Piazzi, 0.130 .	0 30 55.365	. . .	. . .	. . .	−25 27 19.41	. . .	. . .	. . .	. . .
ξ Cassiopeiæ . .	0 35 6.035	. . .	−.052	. . .	+49 49 36.22	. . .	−0.46	. . .	. . .
β Ceti	0 37 18.928	−.053	. . .	−.056	−18 40 23.06	−0.79	. . .	−0.74	−0.75
ν Andromedæ .	0 42 55.591	. . .	−.084	. . .	+40 23 51.56	. . .	+0.56	. . .	. . .
Piazzi, 0.207 .	0 44 52.164	. . .	. . .	−.016	+ 2 42 24.03	. . .	. . .	. . .	−0.75
20 Ceti	0 46 37.206	. . .	. . .	−.044	− 1 49 25.10	. . .	. . .	. . .	+0.50
α Sculptoris . .	0 52 34.879	. . .	. . .	. . .	−30 2 00.74	. . .	. . .	. . .	. . .
μ Cassiopeiæ . .	0 59 58.182	. . .	−.181	. . .	+54 18 21.53	. . .	−0.12	. . .	. . .
37 Ceti	1 8 6.299	. . .	. . .	. . .	− 8 35 43.08	. . .	. . .	. . .	. . .
ω Andromedæ .	1 20 11.101	. . .	+.008	. . .	+44 45 37.14	. . .	+0.14	. . .	. . .
38 Cassiopeiæ . .	1 21 57.489	. . .	+.010	. . .	+69 37 13.52	. . .	−0.45	−0.53	. . .
Piazzi, 1.109 .	1 27 20.439	. . .	. . .	. . .	−37 30 29.55	. . .	. . .	. . .	. . .
τ Andromedæ .	1 33 12.470	. . .	+.048	. . .	+39 56 34.65	. . .	+0.57	. . .	. . .
Piazzi, I. 170 .	1 41 16.704	. . .	−.091	. . .	+37 19 45.96	. . .	+0.33	. . .	. . .
χ Ceti	1 43 26.802	. . .	. . .	. . .	−11 18 20.62	. . .	. . .	. . .	. . .
ζ Ceti	1 45 17.461	−.008	. . .	. . .	−10 57 12.91	+0.35	. . .	. . .	. . .
λ Arietis pr. .	1 50 58.007	. . .	−.035	. . .	+22 59 7.46	. . .	−0.84	. . .	. . .
υ Ceti	1 54 6.932	−.006	. . .	. . .	−21 41 4.62	−0.11	. . .	. . .	. . .
27 Arietis . . .	2 23 58.513	. . .	. . .	+.033	+17 8 58.70	. . .	. . .	. . .	+0.35
σ Ceti	2 26 9.792	. . .	. . .	. . .	−15 47 40.02	. . .	. . .	. . .	. . .
τ^1 Eridani . . .	2 39 16.150	. . .	. . .	. . .	−19 6 11.36	. . .	. . .	. . .	. . .
12 Eridani . . .	3 6 45.715	−.005	. . .	. . .	−29 28 51.16	−0.89	. . .	. . .	. . .
ζ Eridani . . .	3 9 45.753	. . .	. . .	. . .	− 9 17 7.86	. . .	. . .	. . .	. . .
$\varkappa$ Ceti	3 12 48.412	. . .	. . .	. . .	+ 2 54 37.16	. . .	. . .	. . .	. . .
δ Eridani . . .	3 37 15.689	−.024	. . .	. . .	−10 11 18.20	+0.81	. . .	. . .	. . .

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	h. m. s.	s.	s.	s.	° ′ ″	″	″	″	″
τ^7 Eridani . . .	3 42 17.113	. . .	. . .	. . .	−24 15 48.99	. . .	. . .	. . .	. . .
Piazzi, III. 183	3 43 59.103	. . .	. . .	. . .	−38 0 14.53	. . .	. . .	. . .	. . .
γ Eridani . . .	3 52 11.913	−.035	. . .	−.015	−13 51 55.91	−0.57	. . .	−0.57	−0.58
λ Persei . . .	3 57 16.729	. . .	. . .	. . .	+50 0 34.28	. . .	. . .	+0.27	. . .
Piazzi, III. 249 .	4 0 50.047	. . .	. . .	−.033	+17 0 14.26	. . .	. . .	. . .	−0.19
p Tauri	4 3 13.274	. . .	. . .	. . .	+26 9 10.32	. . .	. . .	. . .	. . .
o^2 Eridani . . .	4 9 31.091	. . .	. . .	. . .	− 7 50 56.81	. . .	. . .	. . .	. . .
64 Tauri	4 16 53.468	. . .	. . .	. . .	+17 9 8.66	. . .	. . .	. . .	. . .
v^3 Eridani . . .	4 19 20.501	. . .	. . .	. . .	−34 18 30.59	. . .	. . .	. . .	. . .
80 Tauri	4 23 1.035	. . .	. . .	+.002	+15 21 46.53	. . .	. . .	. . .	−1.19
85 Tauri	4 24 43.435	. . .	. . .	+.046	+15 34 52.50	. . .	. . .	. . .	+0.36
ϱ Tauri	4 26 45.372	. . .	. . .	−.082	+14 34 46.46	. . .	. . .	. . .	−0.60
53 Eridani . . .	4 32 27.381	. . .	. . .	. . .	−14 32 59.80	. . .	. . .	. . .	. . .
π^3 Orionis . . .	4 43 3.329	. . .	. . .	. . .	+ 6 44 28.77	. . .	. . .	. . .	. . .
o^1 Orionis . . .	4 45 27.751	. . .	. . .	. . .	+14 2 25.30	. . .	. . .	. . .	. . .
ν Leporis . . .	5 14 11.033	. . .	. . .	. . .	−12 26 44.28	. . .	. . .	. . .	. . .
m Orionis . . .	5 16 15.865	. . .	. . .	. . .	+ .3 25 20.19	. . .	. . .	. . .	. . .
ψ Orionis . . .	5 20 17.310	. . .	. . .	. . .	+ 2 59 7.85	. . .	. . .	. . .	. . .
α Leporis . . .	5 27 13.041	+.001	. . .	+.010	−17 54 47.62	−0.94	. . .	−1.00	−1.00
ζ Leporis . . .	5 41 17.492	+.023	. . .	. . .	−14 52 13.32	+0.44	. . .	. . .	. . .
β Columbæ . .	5 46 33.181	. . .	. . .	. . .	−35 49 1.82	. . .	. . .	+1.28	. . .
γ Columbæ . .	5 53 6.343	. . .	. . .	. . .	−35 17 53.45	. . .	. . .	. . .	. . .
μ Orionis . . .	5 55 30.384	. . .	. . .	. . .	+ 9 38 42.14	. . .	. . .	. . .	. . .
Piazzi, V. 327 .	5 58 13.402	. . .	. . .	. . .	−26 17 7.87	. . .	. . .	. . .	. . .
θ Columbæ . .	6 3 14.448	. . .	. . .	. . .	−37 14 12.82	. . .	. . .	. . .	. . .
k Orionis . . .	6 9 25.481	. . .	. . .	. . .	+12 18 17.42	. . .	. . .	. . .	. . .
β Canis Majoris .	6 17 11.693	+.024	. . .	. . .	−17 53 43.93	+0.06	. . .	. . .	. . .
Piazzi, VI. 110	6 19 40.864	. . .	. . .	. . .	−36 38 37.13	. . .	. . .	. . .	. . .
ν Geminorum .	6 21 32.455	. . .	. . .	−.015	+20 17 20.48	. . .	. . .	. . .	+0.19
λ Canis Majoris .	6 23 32.083	. . .	. . .	. . .	−32 30 7.06	. . .	. . .	. . .	. . .
13 Monocerotis .	6 26 8.705	. . .	. . .	. . .	+ 7 25 20.71	. . .	. . .	. . .	. . .
Piazzi, VI. 164	6 27 58.293	. . .	. . .	. . .	−31 56 20.71	. . .	. . .	. . .	. . .
ψ^4 Aurigæ . . .	6 33 59.096	. . .	. . .	. . .	+44 38 30.66	. . .	. . .	. . .	. . .
α Canis Majoris .	6 39 38.304	. . .	. . .	. . .	−16 32 46.33	. . .	. . .	. . .	. . .
ψ^7 Aurigæ . . .	6 41 55.527	. . .	. . .	. . .	+41 55 33.21	. . .	. . .	. . .	. . .
o^1 Canis Majoris .	6 48 56.765	. .	. . .	. . .	−24 1 45.73	. . .	. . .	. . .	. . .
ε Canis Majoris .	6 53 42.841	−.047	. . .	−.025	−28 48 12.42	−0.19	. . .	−0.48	−0.47
γ Canis Majoris .	6 58 6.217	−.035	. . .	. . .	−15 27 0.83	−0.25	. . .	. . .	. . .
δ Canis Majoris .	7 3 18.546	−.008	. . .	−.014	−26 11 47.58	+0.84	. . .	+1.05	+1.07
22 Monocerotis .	7 5 28.853	. . .	. . .	. . .	− 0 17 16.14	. . .	. . .	. . .	. . .
66 Aurigæ . . .	7 15 28.942	. . .	. . .	. . .	+40 54 37.93	. . .	. . .	. . .	. .
η Canis Majoris .	7 19 9.070	. . .	. . .	. . .	−29 3 38.21	. . .	. . .	. . .	. . .
6 Canis Minoris .	7 28 50.271	. . .	. . .	. . .	+12 15 46.64	. . .	. . .	. . .	. . .
o Geminorum .	7 31 0.221	. . .	. . .	. . .	+34 52 7.41	. . .	. . .	. . .	. . .
26 Monocerotis .	7 35 16.480	. . .	. . .	. . .	− 9 15 41.19	. . .	. . .	. . .	. . .

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	h. m. s.	s.	s.	s.	° ′ ″	″	″	″	″
4 Navis. . . .	7 40 11.482	. . .	. . .	. . .	−14 15 41.41	. . .	. . .	. . .	. . .
o Navis. . . .	7 42 53.393	. . .	. . .	. . .	−25 37 41.39	. . .	. . .	. . .	. . .
φ Geminorum .	7 45 50.698	. . .	. . .	+.010	+27 5 14.82	. . .	. . .	. . .	−0.12
3 H. Ursæ Majoris	8 0 20.865	. . .	. . .	. . .	+68 50 20.75	. . .	. . .	−0.46	−0.47
ι Navis. . . .	8 2 13.211	+.032	. . .	+.038	−23 56 43.10	−0.31	. . .	−0.28	−0.28
ζ Cancri pr. .	8 5 2.492	. . .	. . .	−.005	+18 1 22.62	. . .	. . .	. . .	−2.04
20 Navis. . . .	8 7 35.207	+.047	. . .	. . .	−15 24 46.93	−0.67	. . .	. . .	. . .
w Navis. . . .	8 16 27.710	. . .	. . .	. . .	−32 39 28.92	. . .	. . .	. . .	. . .
B. A. C. 2846 .	8 22 35.380	. . .	. . .	. . .	−25 43 13.73	. . .	. . .	. . .	. . .
B. A. C. 2887 .	8 29 1.563	. . .	. . .	. . .	+53 50 4.85	. . .	. . .	. . .	. . .
δ Hydræ . . .	8 31 2.271	. . .	. . .	. . .	+ 6 8 18.45	. . .	. . .	. . .	. . .
6 Hydræ . . .	8 34 6.109	. . .	. . .	. . .	−12 2 6.14	. . .	. . .	. . .	. . .
γ Cancri . . .	8 36 3.001	. . .	. . .	+.005	+21 54 59.47	. . .	. . .	. . .	−0.35
ϱ Hydræ . . .	8 41 48.648	. . .	. . .	. . .	+ 6 17 53.04	. . .	. . .	. . .	. . .
35 Lyncis . . .	8 43 33.091	. . .	. . .	. . .	+44 11 24.46	. . .	. . .	. . .	. . .
$\varkappa$ Cancri . . .	9 0 58.512	. . .	. . .	+.025	+11 10 11.54	. . .	. . .	+0.19	+0.19
Piazzi, VIII. 265	9 2 33.676	. . .	. . .	. . .	−25 21 18.66	. . .	. . .	. . .	. . .
e Mali	9 4 38.572	. . .	. . .	. . .	−29 51 22.72	. . .	. . .	. . .	. . .
Piazzi, IX. 63 .	9 15 57.591	. . .	. . .	. . .	−25 26 4.58	. . .	. . .	. . .	. . .
42 Lyncis . . .	9 30 33.128	. . .	. . .	. . .	+40 47 59.08	. . .	. . .	. . .	. . .
ι Hydræ . . .	9 33 28.289	. . .	. . .	. . .	− 0 34 35.74	. . .	. . .	. . .	. . .
ψ Leonis . . .	9 36 55.379	. . .	. . .	−.025	+14 35 32.78	. . .	. . .	. . .	−0.60
φ Ursæ Majoris .	9 43 35.350	. . .	. . .	. . .	+54 38 50.43	. . .	. . .	. . .	. . .
B. A. C. 3398 .	9 49 48.306	. . .	. . .	. . .	+ 9 31 28.43	. . .	. . .	. . .	. . .
B. A. C. 3428 .	9 56 29.599	. . .	. . .	. . .	−12 41 42.32	. . .	. . .	. . .	. . .
v^2 Hydræ . . .	9 59 2.284	. . .	. . .	. . .	−12 27 35.23	. . .	. . .	. . .	. . .
λ Hydræ . . .	10 4 29.676	+.000	. . .	. . .	−11 44 14.78	+1.05	. . .	. . .	. . .
32 Ursæ Majoris .	10 8 55.969	. . .	. . .	. . .	+65 43 51.18	. . .	. . .	−0.49	−0.50
22 Sextantis . .	10 11 25.146	. . .	. . .	. . .	− 7 26 44.29	. . .	. . .	. . .	. . .
γ Leonis pr. . .	10 13 4.762	. . .	. . .	−.033	+20 28 22.93	. . .	. . .	−0.18	−0.18
γ Antliæ . . .	10 18 10.811	. . .	. . .	. . .	−29 1 1.55	. . .	. . .	. . .	. . .
α Antliæ . . .	10 21 25.996	+.038	. . .	. . .	−30 25 56.21	−0.07	. . .	. . .	. . .
48 Leonis . . .	10 28 16.715	. . .	. . .	−.028	+ 7 35 47.61	. . .	. . .	. . .	−0.21
φ Hydræ . . .	10 32 29.585	. . .	. . .	. . .	−16 13 42.19	. . .	. . .	. . .	. . .
36 H. Ursæ Majoris	10 36 11.720	. . .	. . .	. . .	+46 51 37.11	. . .	. . .	. . .	. . .
b^1 Hydræ . . .	10 40 44.701	. . .	. . .	. . .	−16 38 18.63	. . .	. . .	. . .	. . .
ω Ursæ Majoris .	10 46 46.707	. . .	. . .	. . .	+43 51 17.38	. . .	. . .	. . .	. . .
54 Leonis . . .	10 48 50.565	. . .	. . .	. . .	+25 24 56.99	. . .	. . .	. . .	. . .
Piazzi, X. 199 .	10 50 53.697	. . .	. . .	. . .	−36 27 59.93	. . .	. . .	. . .	. . .
α Crateris . . .	10 53 41.134	. . .	. . .	. . .	−17 38 0.74	. . .	. . .	. . .	. . .
p^4 Leonis . . .	11 0 31.636	. . .	. . .	. . .	+ 2 38 1.73	. . .	. . .	. . .	. . .
β Crateris . . .	11 5 30.698	−.002	. . .	. . .	−22 8 38.97	+0.73	. . .	. . .	. . .
n Leonis . . .	11 9 19.484	. . .	. . .	. . .	+13 59 20.11	. . .	. . .	. . .	. . .
δ Crateris . . .	11 13 5.540	−.019	. . .	. . .	−14 6 8.43	−0.69	. . .	−0.76	. . .
λ Crateris . . .	11 17 10.132	. . .	. . .	. . .	−18 5 36.62	. . .	. . .	. . .	. . .

NAME OF STAR.	Right Ascensions for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Newcomb *minus* H. C. O.	Declinations for 1875.0.	Auwers *minus* H. C. O	Safford *minus* H. C. O	Boss *minus* H. C. O.	Newcomb *minus* H. C. O.
	h. m. s.	s.	s.	s.	° ′ ″	″	″	″	″
γ Crateris . . .	11 18 38.318	−.018	. . .	. . .	−16 59 52.29	+0.01	. . .	. . .	. . .
τ Leonis . . .	11 21 30.525	. . .	. . .	−.012	+ 3 32 40.71	. . .	. . .	−0.94	−0.95
ξ Hydræ . . .	11 26 51.362	+.052	. . .	. . .	−31 9 58.96	+0.15	. . .	. . .	. . .
B. A. C. 3934 .	11 28 25.218	. . .	. . .	. . .	−32 10 10.86	. . .	. . .	. . .	. . .
B. A. C. 3973 .	11 36 59.828	. . .	. . .	. . .	+42 24 57.60	. . .	. . .	. . .	. . .
b Virginis . . .	11 53 32.767	. . .	. . .	−.008	+ 4 21 5.77	. . .	. . .	. . .	−1.03
67 Ursæ Majoris .	11 55 45.722	. . .	. . .	. . .	+43 44 20.00	. . .	. . .	. . .	. . .
α Corvi	12 1 58.146	. . .	. . .	+.023	−24 1 54.60	. . .	. . .	. . .	+0.63
ε Corvi . . .	12 3 41.896	+.009	. . .	. . .	−21 55 29.30	+0.57	. . .	. . .	. . .
γ Corvi	12 9 22.781	−.003	. . .	+.004	−16 50 51.33	−0.51	. . .	. . .	−1.12
12 Comæ . . .	12 16 13.233	. . .	−.061	. . .	+26 32 24.01	. . .	+0.23	. . .	. . .
13 Comæ . . .	12 18 2.173	. . .	−.005	. . .	+26 47 31.14	. . .	−0.41	. . .	. . .
15 Comæ . . .	12 20 42.368	. . .	−.020	. . .	+28 57 48.02	. . .	+0.62	. . .	. . .
δ Corvi	12 23 23.870	+.064	. . .	. . .	−15 49 9.28	−0.75	. . .	. . .	. . .
η Corvi	12 25 37.770	. . .	. . .	. . .	−15 30 12.32	. . .	. . .	. . .	. . .
β Corvi	12 27 49.432	−.029	. . .	+.003	−22 42 19.00	−0.39	. . .	−0.44	−0.40
f Virginis . . .	12 30 21.095	. . .	. . .	−.005	− 5 8 33.50	. . .	. . .	. . .	−0.87
χ Virginis . . .	12 32 47.728	. . .	. . .	−.007	− 7 18 26.06	. . .	. . .	. . .	−1.07
65 B. Canum . .	12 39 15.169	. . .	−.064	. . .	+46 7 26.22	. . .	+0.29	. . .	. . .
35 Virginis . . .	12 41 29.545	. . .	. . .	. . .	+ 4 15 19.96	. . .	. . .	. . .	. . .
31 Comæ . . .	12 45 36.518	. . .	+.011	. . .	+28 13 16.80	. . .	−0.16	. . .	. . .
36 Comæ . . .	12 52 44.524	. . .	−.007	. . .	+18 5 1.41	. . .	+0.06	. . .	. . .
14 Canum Venat..	12 59 53.650	. . .	+.057	. . .	+36 28 5.58	. . .	−0.39	. . .	. . .
11 H. Canum Venat.	13 8 2.773	. . .	+.012	. . .	+40 48 54.74	. . .	−0.12	+0.68	. . .
63 Virginis . . .	13 16 19.544	. . .	. . .	. . .	−17 4 47.75	. . .	. . .	. . .	. . .
α Virginis . . .	13 18 36.591	−.026	. . .	−.019	−10 30 29.41	−0.55	. . .	−0.64	−0.64
70 Virginis . . .	13 22 19.025	. . .	−.023	. . .	+14 26 50.67	. . .	−1.54	. . .	. . .
B. A. C. 4513 .	13 24 56.634	. . .	−.102	. . .	+24 52 56.84	. . .	−0.31	−0.21	. . .
25 Canum Venat..	13 31 54.377	. . .	+.133	. . .	+36 55 52.15	. . .	+0.34	. . .	. . .
m Virginis . . .	13 35 3.208	. . .	. . .	. . .	− 8 4 17.58	. . .	. . .	. . .	. . .
83 Virginis . . .	13 37 45.310	. . .	. . .	+.032	−15 32 58.09	. . .	. . .	. . .	−1.52
87 Virginis . . .	13 40 37.580	. . .	. . .	−.012	−17 13 59.76	. . .	. . .	. . .	+0.15
h Centauri . . .	13 46 1.164	. . .	. . .	. . .	−31 18 34.81	. . .	. . .	. . .	. . .
9 Bootis . . .	13 50 51.737	. . .	−.014	. . .	+28 6 20.82	. . .	+0.12	. . .	. . .
θ Centauri . . .	13 59 19.940	. . .	. . .	. . .	−35 45 16.55	. . .	. . .	. . .	. . .
14 Bootis . . .	14 8 4.528	. . .	+.040	. . .	+13 32 48.54	. . .	−1.31	. . .	. . .
λ Virginis . . .	14 12 20.902	. . .	. . .	+.011	−12 47 41.11	. . .	. . .	. . .	−0.09
Piazzi, XIV. 53	14 14 50.584	. . .	. . .	. . .	−34 12 53.15	. . .	. . .	. . .	. . .
2 Libræ . . .	14 16 42.215	. . .	. . .	−.051	−11 8 31.68	. . .	. . .	. . .	+0.11
B. A. C. 4797 .	14 23 5.901	. . .	+.011	. . .	+36 45 24.82	. . .	+0.47	. . .	. . .
5 Ursæ Minoris .	14 27 48.789	. . .	. . .	. . .	+76 15 6.16	. . .	. . .	−0.03	. . .
Piazzi, XIV. 135	14 32 24.151	. . .	. . .	. . .	−26 10 55.56	. . .	. . .	. . .	. . .
ε Bootis seq. . .	14 39 31.672	. . .	+0.04	+.047	+27 36 7.28	. . .	+0.36	+0.51	+0.52
α Libræ . . .	14 43 57.936	+.011	. . .	+.000	−15 31 16.27	−0.01	. . .	+0.10	+0.11
ξ Bootis . . .	14 45 37.458	. . .	+0.26	. . .	+19 37 13.17	. . .	+0.32	. . .	. . .

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	h.	m.	s.	s.	s.	s.	°	′	″	″	″	″	″
δ Libræ . . .	14	54	17.733	. . .	. . .	. . .	− 8	1	17.71	. . .	. . .	. . .	. . .
c Bootis . . .	15	1	48.676	. . .	−.097	. . .	+25	21	25.00	. . .	−0.07	. . .	. . .
ι Libræ . . .	15	5	5.912	+.027	. . .	+.008	−19	19	3.35	+1.02	. . .	. . .	+1.16
25 Libræ . . .	15	6	12.126	. . .	. . .	. . .	−19	10	32.45	. . .	. . .	. . .	. . .
B. A. C. 5009 .	15	6	58.082	. . .	. . .	. . .	−31	3	4.19	. . .	. . .	. . .	. . .
ε Libræ . . .	15	17	25.469	. . .	. . .	. . .	− 9	52	17.49	. . .	. . .	. . .	. . .
ψ^1 Lupi	15	31	49.871	. . .	. . .	. . .	−34	0	8.19	. . .	. . .	. . .	. . .
ψ^2 Lupi	15	34	43.339	. . .	. . .	. . .	−34	18	27.20	. . .	. . .	. . .	. . .
λ Libræ . . .	15	46	4.797	. . .	. . .	−.014	−19	47	29.72	. . .	. . .	. . .	−0.53
δ Scorpii . . .	15	52	56.639	+.044	. . .	+.056	−22	15	51.47	+0.21	. . .	+0.18	+0.19
β Scorpii pr. . .	15	58	10.239	+.018	. . .	+.034	−19	27	41.90	−0.09	. . .	−0.05	−0.05
z Herculis . . .	16	2	26.051	. . .	. . .	. . .	+17	22	52.12	. . .	+0.05	. . .	. . .
v Scorpii seq. . .	16	4	43.942	. . .	. . .	−.009	−19	8	2.60	. . .	. . .	. . .	−0.37
Groombr. 2320	16	5	59.338	. . .	−.071	. . .	+68	8	22.24	. . .	+0.33	+0.48	+0.48
a Scorpii . . .	16	21	44.718	+.006	. . .	+.004	−26	9	9.74	−0.23	. . .	−0.15	−0.15
τ Scorpii . . .	16	28	6.183	. . .	. . .	+.043	−27	57	16.66	. . .	. . .	. . .	−0.30
ζ Ophiuchi . .	16	30	16.637	−.019	. . .	−.012	−10	18	43.87	+0.00	. . .	−0.05	−0.06
24 Scorpii . . .	16	34	20.725	. . .	. . .	+.045	−17	29	53.48	. . .	. . .	. . .	−1.68
ι Ophiuchi . .	16	48	5.642	. . .	−.009	. . .	+10	22	21.81	. . .	−0.10	. . .	. . .
η Ophiuchi . .	17	3	12.617	+.000	. . .	−.001	−15	34	5.31	−0.26	. . .	. . .	−0.51
B. A. C. 5804 .	17	7	7.074	. . .	. . .	. . .	−33	24	6.01	. . .	. . .	. . .	. . .
θ Ophiuchi . .	17	14	20.042	−.004	. . .	−.008	−24	52	21.79	−0.17	. . .	. . .	−0.16
w Herculis. . .	17	15	59.022	. . .	−.035	. . .	+32	37	46.00	. . .	−0.75	. . .	. . .
44 Ophiuchi . .	17	18	44.258	. . .	. . .	+.000	−24	3	29.81	. . .	. . .	+0.09	+0.09
v Scorpii . . .	17	22	15.985	. . .	. . .	. . .	−37	11	38.91	. . .	. . .	. . .	. . .
λ Scorpii . . .	17	25	7.311	. . .	. . .	. . .	−37	0	37.83	. . .	. . .	. . .	. . .
μ Ophiuchi . .	17	31	3.039	. . .	. . .	. . .	− 8	2	26.32	. . .	. . .	. . .	. . .
58 Ophiuchi . .	17	35	56.422	. . .	. . .	+.039	−21	37	13.52	. . .	. . .	. . .	+0.26
3 Sagittarii . .	17	39	41.588	. . .	. . .	−.022	−27	46	51.34	. . .	. . .	. . .	−0.52
Piazzi, XVII. 289	17	48	0.724	. . .	−.003	. . .	+40	0	37.13	. . .	+0.19	. . .	. . .
89 Herculis . . .	17	50	22.659	. . .	+.033	. . .	+26	4	16.52	. . .	+0.01	−0.02	. . .
γ Sagittarii . .	17	57	46.723	+.007	. . .	−.016	−30	25	23.85	−0.32	. . .	−0.54	−0.58
Piazzi, XVII. 359	18	0	10.034	. . .	. . .	. . .	−28	28	7.71	. . .	. . .	. . .	. . .
μ Sagittarii . .	18	6	17.332	−.026	. . .	−.035	−21	5	22.56	+0.17	. . .	+0.36	+0.34
η Sagittarii . .	18	9	10.225	. . .	. . .	. . .	−36	47	49.63	. . .	. . .	. . .	. . .
δ Sagittarii . .	18	12	59.470	. . .	. . .	+.053	−29	52	46.76	. . .	. . .	. . .	+2.38
B. A. C. 6318 .	18	25	58.998	. . .	−.256	. . .	+59	27	58.91	. . .	−0.37	+0.02	. . .
1 Aquilæ . . .	18	28	24.346	. . .	. . .	−.044	− 8	19	46.23	. . .	. . .	−0.71	−0.71
2 Aquilæ . . .	18	35	25.778	. . .	. . .	. . .	− 9	10	12.31	. . .	. . .	. . .	. . .
B. A. C. 6419 .	18	43	55.517	. . .	+.008	. . .	+52	51	4.90	. . .	+0.25	. . .	. . .
σ Sagittarii . .	18	47	30.815	+.026	. . .	+.016	−26	26	59.04	−0.38	. . .	−0.71	−0.70
δ Lyræ	18	49	21.634	. . .	−.013	. . .	+36	48	59.44	. . .	+0.25	. . .	. . .
50 Draconis. . .	18	50	23.936	. . .	. . .	. . .	+75	17	7.87	. . .	. . .	−0.09	−0.09
g Aquilæ . . .	18	56	19.524	. . .	. . .	. . .	− 3	52	40.57	. . .	. . .	. . .	. . .
π Sagittarii . .	19	2	19.785	−.007	. . .	−.006	−21	13	14.31	+0.57	. . .	. . .	+0.86

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	h. m. s.	s.	s.	s.	° ′ ″	″	″	″	″
Piazzi, XIX. 4 .	19 4 59.898	. . .	. . .	. . .	−21 51 49.33	. . .	. . .	. . .	. . .
ψ Sagittarii . .	19 7 52.529	. . .	. . .	−.045	−25 28 12.60	. . .	. . .	. . .	+0.04
d Sagittarii . .	19 10 19.276	. . .	. . .	−.042	−19 10 24.79	. . .	. . .	−0.11	+0.10
χ Sagittarii pr. .	19 17 40.054	. . .	. . .	−.008	−24 44 59.75	. . .	. . .	. . .	+2.55
4 Cygni . . .	19 21 39.051	. . .	−.039	. . .	+36 4 5.38	. . .	+0.10	. . .	. . .
h^1 Sagittarii . .	19 28 26.225	. . .	. . .	−.017	−24 59 27.29	. . .	. . .	. . .	−0.41
h^2 Sagittarii . .	19 29 5.960	−.036	. . .	−.032	−25 9 27.86	+0.57	. . .	. . .	+0.64
$\varkappa$ Aquilæ . . .	19 30 10.022	. . .	. . .	−.059	− 7 18 13.34	. . .	. . .	. . .	−0.04
ε Sagittæ . . .	19 31 37.915	. . .	−.055	. . .	+16 10 59.39	. . .	+0.96	. . .	. . .
B. A. C. 6737 .	19 33 26.425	. . .	+.205	. . .	+63 9 23.13	. . .	+0.33	. . .	. . .
β Sagittæ . . .	19 35 26.123	. . .	−.055	. . .	+17 11 15.79	. . .	−0.23	. . .	. . .
Piazzi, XIX. 243	19 38 2.579	. . .	. . .	. . .	−32 12 28.83	. . .	. . .	. . .	. . .
ζ Sagittæ . . .	19 43 25.747	. . .	+.050	. . .	+18 49 47.16	. . .	+0.12	. . .	. . .
e Draconis . .	20 0 8.911	. . .	−.031	. . .	+64 28 17.03	. . .	−0.87	. . .	. . .
B. A. C. 6924 .	20 2 31.001	. . .	−.013	. . .	+55 58 50.22	. . .	. . .	. . .	. . .
20 Vulpeculæ . .	20 6 46.214	. . .	+.050	. . .	+26 6 24.62	. . .	+0.25	. . .	. . .
ϱ Aquilæ . . .	20 8 29.595	. . .	−.102	. . .	+14 49 4.62	. . .	+0.92	. . .	. . .
a^1 Capricorni . .	20 10 43.139	−.038	. . .	−.020	−12 53 34.97	+0.04	. . .	. . .	+0.18
a^2 Capricorni . .	20 11 7.084	+.006	. . .	+.007	−12 55 51.99	+1.02	. . .	+1.03	+1.12
β Capricorni . .	20 13 59.260	−.028	. . .	−.035	−15 10 28.54	−0.31	. . .	. . .	−0.16
B. A. C. 7008 .	20 15 43.451	. . .	−.043	. . .	+39 0 36.13	. . .	−0.22	. . .	. . .
π Capricorni . .	20 20 9.908	. . .	. . .	−.002	−18 37 12.33	. . .	. . .	+0.11	+0.09
ϱ Capricorni . .	20 21 43.770	+.007	. . .	−.008	−18 13 31.35	−0.19	. . .	. . .	−0.19
41 Cygni . . .	20 24 17.349	. . .	−.008	. . .	+29 57 9.58	. . .	−0.24	. . .	. . .
ζ Delphini. . .	20 29 27.845	. . .	−.052	. . .	+14 14 39.01	. . .	+0.52	. . .	. . .
Groom. 3241 .	20 30 31.863	. . .	. . .	. . .	+72 6 29.32	. . .	. . .	−0.23	−0.23
μ Aquarii . . .	20 45 54.693	. . .	. . .	−.045	− 9 27 4.10	. . .	. . .	+0.11	+0.11
Piazzi, XX. 429(seq)?	20 54 29.921	. . .	. . .	. . .	+49 58 38.28	. . .	. . .	. . .	. . .
η Capricorni . .	20 57 17.378	. . .	. . .	−.051	−20 20 52.77	. . .	. . .	. . .	−0.48
γ Equulei . . .	21 4 15.767	. . .	. . .	. . .	+ 9 37 45.01	. . .	. . .	. . .	. . .
σ Cygni . . .	21 12 30.470	. . .	−.067	. . .	+38 52 17.31	. . .	+0.10	−0.09	. . .
b Capricorni . .	21 21 35.596	. . .	. . .	. . .	−22 21 2.23	. . .	. . .	. . .	. . .
ϱ Cygni . . .	21 29 16.847	. . .	+.003	. . .	+45 2 23.78	. . .	−0.59	. . .	. . .
ξ Aquarii . . .	21 31 5.817	. . .	. . .	−.005	− 8 24 49.18	. . .	. . .	−0.54	−0.54
γ Capricorni . .	21 33 9.835	−.009	. . .	−.022	−17 13 32.48	−0.81	. . .	. . .	−0.49
$\varkappa$ Capricorni . .	21 35 40.593	. . .	. . .	−.052	−19 26 5.92	. . .	. . .	. . .	−0.49
δ Capricorni . .	21 40 8.418	−.018	. . .	+.013	−16 41 36.70	−0.25	. . .	. . .	−0.42
14 Pegasi . . .	21 44 18.994	. . .	−.080	. . .	+29 35 35.10	. . .	−0.56	. . .	. . .
μ Capricorni . .	21 46 28.815	. . .	. . .	−.037	−14 8 20.83	. . .	. . .	−0.67	−0.67
Piazzi, XXI. 336	21 48 54.419	. . .	−.020	. . .	+55 37 25.50	. . .	+0.18	+0.04	. . .
13 Cephei . . .	21 50 41.170	. . .	+.004	. . .	+56 1 11.11	. . .	−0.32	. . .	. . .
79 Draconis . .	21 51 18.660	. . .	. . .	. . .	+73 6 39.95	. . .	. . .	+0.07	+0.08
η Piscis Austr. .	21 53 39.148	. . .	. . .	. . .	−29 3 9.95	. . .	. . .	. . .	. . .
o Aquarii . . .	21 56 50.952	. . .	. . .	. . .	− 2 45 29.27	. . .	. . .	. . .	. . .
1 H. Lacertæ . .	22 8 30 948	. . .	−.131	. . .	+39 5 42.90	. . .	+0.21	+0.29	. . .

NAME OF STAR.	Right Ascensions for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Newcomb *minus* H. C. O.	Declinations for 1875.0.	Auwers *minus* H. C. O.	Safford *minus* H. C. O.	Boss *minus* H. C. O.	Newcomb *minus* H. C. O.
	h. m. s.	s.	s.	s.	° ′ ″	″	″	″	″
ϱ Aquarii . . .	22 13 37.255	. . .	. . .	+.010	− 8 26 53.90	. . .	. . .	. . .	+1.04
B. A. C. 7803 .	22 16 41.750	. . .	−.040	. . .	+43 6 57.01	. . .	+0.04	. . .	. . .
π Aquarii . . .	22 18 53.569	. . .	. . .	−.027	+ 0 44 36.65	. . .	. . .	+0.80	+0.79
ζ Aquarii med. .	22 22 23.723	. . .	. . .	. . .	− 0 39 32.91	. . .	. . .	. . .	. . .
β Piscis Austr. .	22 24 23.653	. . .	. . .	. . .	−32 59 11.36	. . .	. . . .	. . .	. . .
226 B. Cephei . .	22 30 4.184	. . .	. . .	. . .	+75 34 56.29	. . .	. . .	+0.31	+0.31
ε Piscis Austr. .	22 33 44.346	. . .	. . .	. . .	−27 41 42.81	. . .	. . .	. . .	. . .
δ Aquarii . . .	22 48 0.927	−.037	. . .	. . .	−16 29 6.96	+0.25	. . .	. . .	. . .
α Piscis Austr. .	22 50 44.396	−.014	. . .	−.019	−30 17 3.52	−0.53	. . .	−0.35	−0.36
Piazzi, XXII. 262	22 52 45.342	. . .	. . .	. . .	−30 7 54.46	. . .	. . .	. . .	. . .
55 Pegasi . . .	23 0 42.481	. . .	. . .	. . .	+ 8 44 4.00	. . .	. . .	. . .	. . .
c^2 Aquarii . . .	23 2 46.808	+.017	. . .	. . .	−21 51 2.93	+0.53	. . .	. . .	. . .
59 Pegasi . . .	23 5 25.571	. . .	. . .	. . .	+ 8 2 29.32	. . .	. . .	. . .	. . .
φ Aquarii . . .	23 7 50.929	. . .	. . .	. . .	− 6 43 21.32	. . .	. . .	. . .	. . .
ψ^3 Aquarii . . .	23 12 27.548	. . .	. . .	−.017	−10 17 39.49	. . .	. . .	. . .	+1.28
o Cephei . . .	23 13 29.972	. . .	+.061	. . .	+67 25 40.04	. . .	+0.13	+0.31	+0.31
b^1 Aquarii . . .	23 16 24.228	. . .	. . .	. . .	−20 46 58.52	. . .	. . .	. . .	. . .
θ Piscium . . .	23 21 37.677	. . .	. . .	−.016	+ 5 41 33.16	. . .	. . .	−0.31	−0.32
b^3 Aquarii . . .	23 26 44.012	. . .	. . .	. . .	−21 36 19.16	. . .	. . .	. . .	. . .
15 Andromedæ .	23 28 30.861	. . .	. . .	. . .	+39 32 49.88	. . .	. . .	. . .	. . .
ι^1 Aquarii . . .	23 37 43.014	. . .	. . .	. . .	−18 58 14.19	. . .	. . .	. . .	. . .
ψ Andromedæ .	23 39 50.685	. . .	−.002	. . .	+45 43 34.22	. . .	+0.48	. . .	. . .
δ Sculptoris . .	23 42 24.703	+.011	. . .	. . .	−28 49 17.03	−0.59	. . .	. . .	. . .
Piazzi, XXIII. 204	23 44 8.030	. . .	−.068	. . .	+50 55 38.07	. . .	+1.52	. . .	. . .
Groom. 4163 .	23 48 46.199	. . .	. . .	. . .	+73 42 51.86	. . .	. . .	+1.29	+1.29
Piazzi, XXIII. 237	23 50 50.956	. . .	−.117	. . .	+55 0 36.81	. . .	+1.25	. . .	. . .
30 Piscium . . .	23 55 32.926	. . .	. . .	+.029	− 6 42 32.08	. . .	. . .	. . .	+0.10
2 Ceti	23 57 20.130	. . .	. . .	. . .	−18 1 55.09	. . .	. . .	. . .	. . .
33 Piscium . . .	23 58 56.229	. . .	. . .	+.014	− 6 24 24.93	. . .	. . .	. . .	+0.27

It will be seen that the deviations of the positions of both the Primary and the Secondary catalogues from the system of Auwers are well distributed, whatever the extent or the order of the combination of the residuals which may be chosen. This distribution is not quite so well effected in the comparisons with Safford, Boss, and Newcomb; first, because it is based upon a less number of stars, and second, because it involves the determination of the systematic relation between three catalogues instead of two. These relations are exhibited in the following tables:—

RESIDUALS ARRANGED IN THE ORDER OF RIGHT ASCENSION.

All the stars between −10° and +60° declination are included in this comparison except η Cassiopeiæ, θ Draconis, η Draconis, Groombridge 2377, and b Draconis.

Primary Catalogue.

Auwers *minus* H. C. O.		Safford *minus* H C. O.		Newcomb *minus* H C. O.	
No. Stars	Δα	No. Stars	Δα	No. Stars	Δα
In groups of One Hour.					
9	s. −.002	6	s. +.027	5	s. +.000
9	+.004	6	−.011	6	−.006
15	+.000	. .	. . . .	5	−.013
13	−.002	. .	. . . .	8	−.003
14	+.000	. .	. . . .	7	−.006
14	−.001	. .	. . . .	6	+.007
6	−.002	. .	. . . .	4	+.003
11	+.000	. .	. . . .	7	+.006
8	+.008	. .	. . . .	4	−.021
10	+.002	. .	. . . .	6	−.002
10	+.002	. .	. . . .	5	+.003
10	−.006	. .	. . . .	7	+.003
5	+.007	3	−.001	3	+.021
7	+.001	4	+.017	4	+.005
10	−.005	9	−.004	4	+.011
12	+.007	8	−.006	4	+.021
11	−.006	7	+.000	3	−.005
7	−.003	7	+.008	5	+.006
9	+.011	8	+.002	4	+.017
9	−.004	5	+.016	4	−.001
9	+.003	8	+.001	4	+.010
8	−.013	5	−.013	5	−.012
16	−.001	11	−.010	5	+.004
8	+.013	8	+.047	2	+.010
Means	+.000	. .	+.004	. .	+.002
In groups of Two Hours.					
18	s. +.001	12	s. +.008	11	s. −.003
28	−.001	. .	. . . .	13	−.007
28	−.001	. .	. . . .	13	+.000
17	−.001	. .	. . . .	11	+.005
18	+.005	. .	. . . .	10	−.010
20	−.002	. .	. . . .	12	+.003
12	+.004	17	+.009	7	+.012
22	+.001	17	−.005	8	+.016
18	s. −.005	14	s. +.004	8	s. +.002
18	+.003	13	+.007	8	+.008
17	−.005	13	−.004	9	−.002
24	+.004	19	+.014	7	+.006
Means	+.000	. .	+.004	. .	+.002
In groups of Three Hours.					
33	s. +.001	. .	s. . . .	16	s. −.006
41	−.001	. .	. . . .	21	−.001
25	+.002	. .	. . . .	15	−.002
30	−.001	. .	. . . .	18	+.001
22	+.000	16	+.002	11	+.012
30	+.000	22	+.000	12	+.008
27	+.003	21	+.005	12	+.009
32	+.000	24	+.008	12	−.002
Means	+.000	. .	+.004	. .	+.002
In groups of Four Hours.					
46	s. +.000	. .	s. . . .	24	s. −.005
45	−.001	. .	. . . .	24	+.002
38	+.001	. .	. . . .	22	−.003
34	+.002	34	+.002	15	+.014
36	−.001	27	+.005	16	+.005
41	+.001	32	+.007	16	+.002
Means	+.000	. .	+.004	. .	+.002
In groups of Six Hours.					
74	s. +.000	. .	s. . . .	37	s. −.003
55	+.000	. .	. . . .	33	+.000
52	+.000	38	+.001	23	+.010
59	+.001	45	+.007	12	+.003
Means	+.000	. .	+.004	. .	+.001

RESIDUALS ARRANGED IN THE ORDER OF DECLINATION.

Limits in Right Ascension.	Auwers *minus* H. C. O.			Safford *minus* H. C. O.			Newcomb *minus* H. C. O.			Boss *minus* H. C. O.	
	No. Stars	$\Delta\alpha$	$\Delta\delta$	No. Stars.	$\Delta\alpha$	$\Delta\delta$	No. Stars.	$\Delta\alpha$	$\Delta\delta$	No Stars.	$\Delta\delta$
					$-10^\circ \ldots +5^\circ$						
h. h.		s.	"		s.	"		s.	"		"
0 ... 6	19	−.001	+.06	..	....	...	9	−.007	−.03	6	+.03
6 ... 12	4	+.004	+.06	..	....	...	3	+.003	−.23	3	+.00
12 ... 18	12	+.007	+.12	..	....	...	8	+.014	+.13	7	+.13
18 ... 24	12	−.008	−.10	..	....	...	8	−.005	−.13	9	−.04
Means ...	..	+.000	+.04	..	....	...	..	+.001	+.03	..	+.03
					$+5^\circ \ldots +20^\circ$						
h. h.		s.	"		s.	"		s.	"		"
0 ... 6	16	+.003	+.02	..	....	...	14	+.003	+.09	14	+.09
6 ... 12	19	+.005	+.02	..	...	..	16	−.001	−.07	11	+.17
12 .. 18	14	−.004	−.05	12	−.004	+.01	6	+.008	+.10	8	+.08
18 ... 24	16	+.002	+.04	11	+.003	+.27	9	+.008	+.02	12	+.01
Means ...	..	+.002	+.01	..	+.000	+.13	..	+.003	+.02	..	+.09
					$+20^\circ \ldots +35^\circ$						
h h		s.	"		s.	"		s.	"		"
0 ... 6	16	−.001	−.07	5	+.009	+.27	11	−.015	−.10	11	+.01
6 ... 12	16	−.007	−.02	..	....	...	10	+.002	−.18	11	+.06
12 ... 18	10	+.007	+.05	10	+.012	−.01	3	+.021	−.09	8	−.06
18 ... 24	14	+.007	−.06	14	+.003	−.04	2	+.016	−.18	11	−.08
Means ...	..	+.001	−.03	..	+.007	+.02	..	−.002	−.14	..	−.01
					$+35^\circ \ldots +50^\circ$						
h. h.		s	"		s	"		s	"		"
0 ... 6	16	−.003	+.01	3	−.003	+.27	3	+.008	+.13	11	−.03
6 .. 12	12	+.000	+.11	..	....	...	..	....	..	9	+.14
12 ... 18	9	−.003	−.18	9	−.005	−.23	4	−.006	−.34	7	−.26
18 ... 24	12	−.004	+.00	12	+.001	−.08	5	+.001	+.06	9	+.11
Means ...	..	−.003	+.00	..	−.002	−.09	..	+.000	−.06	..	+.00
					$+50^\circ \ldots +65^\circ$						
h h		s	"		s	"		s.	"		"
0 ... 6	11	−.008	+.07	4	+.000	+.12	2	+.029	−.04	7	+.24
6 .. 12	5	−.007	+.01	..	...	...	..	...	...	3	−.13
12 .. 18	10	−.003	−.02	10	+.005	+.03	3	+.009	−.01	10	−.05
18 .. 24	7	+.019	+.02	7	+.018	+.18	..	....	...	5	+.09
Means ...	..	−.001	+.02	..	+.008	+.10	..	+.017	−.02	..	+.05
					$+65^\circ \ldots +80^\circ$						
h. h.		s.	"		s.	"		s.	"		"
0 ... 6	18	−.004	+.09	2	−.067	+.19	7	....	−.06	9	−.22
6 ... 12	18	−.017	−.02	..	....	...	6	....	−.18	6	−.18
12 ... 18	19	−.014	−.05	7	+.007	−.14	8	....	−.15	10	+.23
18 ... 24	20	+.002	−.01	5	−.034	+.13	9	....	+.08	11	+.08
Means ...	..	−.008	+.00	..	−.018	+.00	..	....	−.07	..	+.00

Secondary Catalogue.

Limits in δ	Auwers *minus* H. C. O.		Safford *minus* H. C. O.		Newcomb *minus* H. C. O.		Boss *minus* H. C. O.
	Δα	Δδ	Δα	Δδ	Δα	Δδ	Δδ
	s.	″	s.	″	s.	″	″
−30° . . . − 5°	+.000	+.00	. . . .	. . .	+.006	−.18	−.18
− 5 . . . +20	. . . .	. . .	−.019	−.03	−.012	−.33	−.06
+20 . . . +45	. . . .	. . .	−.023	+.02	+.001	+.04	+.14
+45 . . . +70	. . . .	. . .	−.015	+.08	. . . .	−.05	−.05
+70 . . . +85	. . . .	. . .	. . . .	. . .	. . . .	+.36	+.22

The extraordinary agreement of the reduced positions of Safford, Newcomb, and Boss, especially in declination, with the Normal System, will not escape attention. It cannot be expected that any single catalogue will exhibit the same degree of agreement, especially if, as is the case with the Harvard College Catalogue, it has been constructed from observations made subsequent to those upon which the Normal System is founded. It is probable therefore that in a majority of the cases in which the deviations from the normal system are large, the residuals represent accidental errors of observation in the present catalogue.

To this class *probably* belong the following stars: —

In Right Ascension.	In Declination.	
c Persei.	55 Cassiopeiæ.	4 Ursæ Minoris.
o^1 Eridani.	67 Ceti.	109 Virginis.
10 Camelopardi.	Groombridge 716.	δ Bootis.
η Leonis.	9 H. Camelopardi.	δ Aquilæ.
ξ Ursæ Majoris, med.	Groombridge 848.	*v* Cygni.
γ Virginis.	12 Canum Venaticorum, seq.	β Aquarii.
Groombridge 2415.		

On the other hand, I shall be disappointed if future observations do not confirm the substantial accuracy of the values given for the right ascensions of the following stars, viz.; Groombridge 29, η Cassiopeiæ, 36 Camelopardi, 1 H. Draconis, Groombridge 2164, θ Draconis, η Draconis, Groombridge 2377, *b* Draconis, β Lyræ (perhaps), Groombridge 2900, and *v* Pegasi. The discussion of positions which are apparently erroneous will be reserved for another paper. It will, however, be instructive to record the present state of the testimony with respect to these stars as given in the discussion of Dr. Auwers, to which are added the positions from this catalogue instead of the places taken from Vol. X. of the Annals. Both coördinates are for 1875.0.

LIST OF STARS EXHIBITING A DISCORDANCE IN RIGHT ASCENSION.

STAR.	Pulkowa.			Greenwich.		H. C. O.
	1865.	1871.	1845.	1861.	1872.	1875.
	h. m. s.	s.	s.	s.	s.	s.
Gr. 29 = B 2.6	0 9	10.298	. . . .	9.969	10.217	10.378
η Cassiopeiæ . .	0 41 32.841	. . . .	32.762	32.815	32.949	32.938
c Persei . . .	3 59 35.568	. . . .	35.544	35.429	. . . .	35.605
o^1 Eridani . . .	4 5	45.926	. . . .	45.873	45.890	45.850
10 Camelop. . .	4 52 18.386	. . . .	18.363	18.448	18.379	18.318
36 Camelop. . .	6 0	16.488	. . . .	16.281	16.448	16.531
1 H. Draconis .	9 19 5.801	. . . .	5.620	5.749	5.605	5.932
η Leonis . . .	10 0 30.991	. . . .	31.031	31.008	30.973	30.942
ξ Ursæ Majoris .	11 11 30.680	. . . .	30.594	30.629	30.742	30.709
γ Virginis . . .	12 35 19.635	. . . .	19.626	19.634	19.591	19.567
Groom. 2164 .	14 48	16.068	16.080	16.036	. . . .	16.196
θ Draconis . .	15 59 32.979	. . . .	33.082	33.074	33.065	32.928
η Draconis . .	16 22 18.166	. . . .	18.328	18.273	18.133	18.077
Groom. 2377 .	16 42	55.724	55.854	55.720	55.705	55.637
Groom. 2415 .	17 3	42.146	. . . .	. . . .	. . . .	42.190
β Lyræ	18 45 27.928	. . . .	27.923	27.942	27.920	27.840
Groom. 2900 .	19 29	12.997	. . . .	. . . .	12.747	13.082
v Pegasi . . .	23 19	8.530	. . . .	8.472	8.547	8.428

LIST OF STARS EXHIBITING A DISCORDANCE IN DECLINATION.

STAR.	R.A.	Pulkowa.			Greenwich.		Leipsig.	Leiden.	H. C. O.
		1865.		1871.	1845.	1861.	1872.	1868.	1868.	1875.
	h. m.	° ′ ″		″	″	″	″	″	″	″
55 Cassiopeiæ . .	2 5	+65 56 . . .		13.21	. . .	13.30	12.22	. . .	. . .	11.37
67 Ceti	2 11	— 6 59 . . .		55.76	. . .	57.55	57.33	57.02	. . .	58.57
Groom. 716. .	3 31	+62 48 . . .		32.32	. . .	32.78	32.32	32.26	. . .	33.52
9 H. Camelop. .	3 46	+60 44 . . .		24.09	. . .	24.43	24.26	26.22	. . .	23.26
Groom. 848 .	4 32	+75 42 . . .		32.70	. . .	32.53	32.60	. . .	. . .	31.35
12 Can. Ven. . .	12 50	+38 59 37.88		. . .	37.83	38.05	37.59	37.82	37.63	39.21
4 Ursæ Minoris .	14 9	+78 8 . . .		5.48	. . .	6.90	5.45	. . .	. . .	7.23
109 Virginis . . .	14 40	+ 2 25 15.34		. . .	14.72	14.64	. . .	. . .	. . .	13.49
δ Bootis . . .	15 10	+33 46 55.99		. . .	56.24	55.96	55.83	. . .	. . .	55.11
δ Aquilæ . . .	19 19	+ 2 52 1.36		. . .	1.41	1.50	1.28	0.89	1.67	2.56
ν Cygni . . .	20 52	+40 41 12.33		. . .	12.35	12.12	. . .	. . .	. . .	11.08
β Aquarii . . .	21 25	— 6 7 12.40		. . .	12.46	12.81	12.81	11.96	12.53	10.83

COMPARISON OF THE FOUR CATALOGUES UNDER CONSIDERATION BY MEANS OF THEIR PROPER MOTIONS.

Since the proper motion is a direct function of the time, it is possible to determine the exact amount by which two catalogues will differ at the expiration of a given time. If the two systems of proper motions differ systematically, these systematic errors will be introduced into the catalogues themselves. In general, the constant part of the deviation may be considered as a function of the precession constant. The explanation of the variable part in any given case is for the most part exceedingly difficult. For example: it is easy to account for the systematic deviations between Auwers and Boss, by referring them to the corresponding deviations between the system of Bradley on the one hand and the mean of the systems of Bessel, Struve, and Argelander on the other, but I have found it impossible to trace the origin of the differences between these fundamental systems. I give below the comparison of each authority with Auwers. Columns I. and II. contain the values of $\Delta\mu$ and $\Delta\mu'$ for the first and the second twelve hours of right ascension respectively. The proper motions of the secondary catalogue form the basis of the comparison in the Harvard College Observations; the corresponding values were communicated by Dr. Auwers to Professor Pickering for facilitating the reductions in Vol. XII. of the Annals. In the comparison with Safford in right ascension, $\Delta\mu$ involves the change from the constants of Bessel to those of Struve. I have assumed the mean value to be the constant part of the deviation.

AUWERS *minus* HARVARD COLLEGE.

Limits in δ	$\Delta\mu$	I.	II.	Number Stars.	$\Delta\mu'$	I.	II.	Number Stars.
° °	s.	s.	s.		″	″	″	
−31 . . . −20	−.00033	−.00020	−.00049	41	+.0018	+.0014	+.0021	40
−20 . . . −10	−.00032	−.00019	−.00039	44	+.0039	+.0045	+.0029	42
−10 . . . + 0	−.00030	−.00023	−.00038	24	+.0030	+.0020	+.0041	23
+ 0 . . . +10	−.00018	−.00006	−.00031	18	+.0014	+.0008	+.0015	18
+10 . . . +20	−.00017	+.00000	−.00031	19	+.0012	+.0022	+.0003	19
+20 . . . +30	−.00011	+.00003	−.00023	18	−.0008	+.0005	−.0024	17
+30 . . . +40	−.00023	−.00052	+.00000	9	+.0018	−.0012	+.0042	21
+40 . . . +50	−.00010	+.00003	−.00026	11	+.0019	+.0030	+.0008	11
+50 . . . +70	+.00045	+.00052	+.00038	8	+.0001	−.0002	+.0005	8
Means. . .	−.00014	−.00007	−.00022	. .	+.0016	+.0014	+.0016	. .

AUWERS *minus* SAFFORD.

Limits in δ	Δμ	I.	II.	Number Stars.	Δμ′	I.	II.	Number Stars.
	s.	s.	s.		″	″	″	
Const. =	−.00222	−.00235	−.00210					
+10° . . . +20°	+.00018	+.00025	−.00010	36	−.0006	−.0007	−.0005	36
+20 . . . +30	−.00052	+.00005	−.00090	35	+.0020	+.0012	+.0024	35
+30 . . . +40	+.00038	+.00085	+.00010	28	+.0074	+.0076	+.0073	28
+40 . . . +50	−.00082	−.00045	−.00120	33	−.0034	−.0050	−.0018	33
+50 . . . +60	−.00072	−.00075	−.00080	33	+.0033	+.0020	+.0050	33
+60 . . . +70	+.00148	+.00015	+.00290	28	+.0005	+.0006	+.0004	28
Means. . .	−.00222	−.00235	−.00210	. .	+.0015	+.0010	+.0021	. .
AUWERS *minus* NEWCOMB.								
−30 . . . −20	−.00084	−.00108	−.00063	13	+.0126	+.0140	+.0114	13
−20 . . . −10	−.00100	−.00098	−.00102	25	+.0147	+.0128	+.0165	25
−10 . . . + 0	−.00103	−.00087	−.00116	20	+.0079	+.0078	+.0080	20
+ 0 . . . +10	−.00108	−.00122	−.00094	30	+.0138	+.0166	+.0112	30
+10 . . . +20	−.00083	−.00104	−.00064	30	+.0123	+.0107	+.0137	30
+20 . . . +30	−.00085	−.00091	−.00084	26	+.0096	+.0087	+.0106	26
+30 . . . +40	−.00071	+.00012	−.00153	12	+.0182	+.0208	+.0157	12
+40 . . . +50	−.00057	−.00078	−.00040	9	+.0062	−.0015	+.0124	9
+50 . . . +60	−.00113	−.00090	−.00137	6	+.0043	+.0027	+.0060	6
+60 . . . +70	−.00101	+.00020	−.00242	13	−.0035	−.0006	−.0070	13
[+70 . . . +85	−.00349	−.00382	−.00317]	20	−.0027	−.0003	−.0051	20
Means. . .	−.00091	−.00075	−.00110	. .	+.0085	+.0083	+.0085	. .

AUWERS *minus* BOSS.

Limits in δ	Δμ′	I.	II.	Number Stars.
	″	″	″	
−30° . . . −20°	+.0097	+.0090	+.0102	9
−20 . . . −10	+.0137	+.0140	+.0136	9
−10 . . . + 0	+.0094	+.0113	+.0081	17
+ 0 . . . +10	+.0154	+.0155	+.0150	27
+10 . . . +20	+.0122	+.0137	+.0110	31
+20 . . . +30	+.0105	+.0120	+.0085	37
+30 . . . +40	+.0167	+.0188	+.0157	35
+40 . . . +50	+.0047	+.0077	+.0015	41
+50 . . . +60	+.0020	+.0045	−.0005	. .
+60 . . . +70	−.0022	−.0032	−.0013	. .
+70 . . . +85	−.0043	−.0030	−.0050	. .
Means	+.0080	+.0091	+.0070	. .

Comparing the deviations between the different systems in a century, we have the following results: —

CATALOGUES.	Maximum mean Deviation in a Century.		Maximum systematic Deviation in a Century.	
	$\Delta\alpha$	$\Delta\delta$	$\Delta\alpha$	$\Delta\delta$
	s	"	s.	"
Auwers *minus* Harvard College	−.01	+0.2	.08	0.6
Auwers *minus* Safford	−.22	+0.2	.23	1.1
Auwers *minus* Boss	. . .	+0.8	. .	2.1
Auwers *minus* Newcomb	−.09	+0.8	.06	2.2

It will be seen from the foregoing comparison that *if we may consider the system of Auwers as an absolute standard*, three classes of errors will be introduced into any system of observations which depends upon the systems, either of Safford, Boss, or Newcomb. These are: —

(*a*) A constant error which is a direct function of the time.

(*b*) Systematic errors which result from those errors in the proper motion, which are functions either of the right ascension or of the declination, and whose magnitude is proportional to the distance from the assumed common epoch.

(*c*) Errors which will be introduced through the constant n, resulting from a change in the relation between the places of the equatorial, and of the polar stars in the fundamental system chosen.

The effect of these errors will be sensible in the following cases: —

Class (*a*) Safford in right ascension.
Class (*b*) Boss and Newcomb in declination.
Class (*c*) Newcomb (Gould) in right ascension.

But there is no *decisive* evidence that the system of Auwers is to be preferred to the system of Newcomb in right ascension (from $\delta = -30^\circ$ to $\delta = +60^\circ$) or to the system of Boss in Declination.

We must therefore conclude that the problem of the construction of a homogeneous system of stellar coördinates which will satisfy all past observations and which future observations may be relied upon to verify, has not yet been completely solved.

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